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The Physiotherapy Review

Vol. XIII No. 6

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Brachial Birth Palsy

By Philip Lewin, M.D., Chicago

Brachial birth palsy, sometimes called obstetrical paralysis[2] is a condition found at birth in which there is loss of use of part or all of an upper extremity. It was described by Smellie in 1768, then by Duchenne in 1872, and by Erb in 1874.

PATHOLOGY.—The pathologic changes are found in the nerves of the brachial plexus. Erb discovered a lesion of the 5th and 6th cervical nerves at a point from 2 to 3 cm. above the clavicle and just behind the posterior edge of the sternocleido-mastoid muscle—now known as Erb's point. Usuaully at this point there is a mass composed of nerve and scar tissue. The tendons of the subscapularis, pectoralis major and teres major muscles are contracted. The inferior portion of the capsule of the shoulder joint is fibrotic and contracted.

The neural lesions are divisible into immediate and remote types. The immediate neural lesion is a tearing of the perineural sheath surrounding and supporting the nerve trunk and the rupture of blood vessels belonging to it. There is a more or less complete severance of some of the nerve strands. The remote results are brought about and their extent determined by the healing of the perineural sheath, the organization of the blood clot, and the contraction of the cicatrix upon the nerve strands, which not only prevents the regeneration of the severed fibers, but gives rise to pressure neuritis of unsevered fibers.

The neural damage varies from slight tearing of the perineural sheath and hemorrhage into the nerve itself to complete laceration of the nerve trunk. The milder types are more common, and therefore, in the majority of cases, complete recovery ensues. In the more serious cases, the anterior primary division of one or more nerves may actually be pulled out of the spinal cord.

The source of these lesions is the overstretching caused by obstetrical separation of the head and shoulder on the paralyzed side. From the anatomic disposition of the nerves, the upper roots suffer the strain first; after they begin to yield, the lower roots experience it. For this reason the palsy is most marked in the upper root zones. The roots may be slightly overstretched, causing temporary palsy followed by rapid recovery. The roots may be entirely torn across, and the ends displaced. The lesion may involve part of one root or all five roots or any variation between these extremes. The lesion may be at the origin of the root from the cord, i. e., "avulsion of the root," or it may be at the lower portion of the plexus or at any site between. In addition to the nerve damage, in all but the mildest cases, tearing of the deep cervical fascia anterior to the plexus, and also of the scaleni muscles occurs.

[1]Read before The American Physical Therapy Association, June 16, 1933, Chicago, Illinois.

[2]The term "obstetrical paralysis" should be avoided because it is too much like the term "obstetrician's paralysis."

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The pathological changes include, torn fascia, torn muscle, torn nerve sheath and torn nerve, all infiltrated with blood from the torn vessels. As time passes, a hard cicatrix binds all these structures together and forms an impassable barrier to regenerating nerve and to nerve impulses. In addition to these immediate pathologic changes, there are certain pathologic sequelae when nerve repair does not occur. In the majority of cases, the muscles are paralyzed in groups, resulting in characteristic attitudes of the paralyzed extremity. Later on the bones become distorted and the ligaments and muscles contract, producing a deformity.

ETIOLOGY.—The cause of brachial palsy is still under discussion. A critical analysis of the many theories permits their division into two groups: the one assumes a trauma to the cervical nerves by pressures or by traction; and the other, an injury to the shoulder joint, i. e., a detachment of the epiphysis, a laceration of the capsule or a dislocation of the humerus.

Exact information on the causes is deplorably lacking on account of the lack of interest of the obstetrician in the problem, which in turn prevents the orthopaedic surgeon from seeing this condition in the early stage.

Anatomic facts prove that partial or complete laceration of cervical nerves occurs. Most recent writers, with the exception of Thomas, look on the subluxation as secondary to a primary paralysis.

Some brachial palsies are the result of poor obstetrics; some of unfortunate obstetrics. Others offer no more criticism of the obstetrician than the delivery of a baby with a clubfoot. The majority of observers agree with Taylor that the damage is done by the stretching of nerves of the brachial plexus in forcible separation of the head from the shoulder during delivery or by direct obstetrical traction on the arm. Experiments have shown that traction can produce the lesion. It can be produced by pulling the arm, by hyperabduction at the shoulders and by forceful elevation of the arm at the shoulder. That the lesion is more frequent after breech than after vertex labors seemingly represents the view prevailing among obstetricians.

SYMPTOMS.—The symptoms are weakness or paralysis of part or of all of the upper extremity. There are three recognized types: the upper arm type (Duchenne-Erb), the lower arm type (Klumpke) and the whole arm type. The lower arm type is usually associated with the upper arm type.

The more common type, that of the upper arm, involves the 5th and 6th cervical roots and the suprascapular nerve which produces paralysis of the muscles of the upper arm, with the exception of the supinators. The arm hangs limp at the side in a position of adduction, internal rotation, pronation and palmar flexion. It has been called the "waiter's tip" position. The muscles paralyzed are the deltoid, supraspinatus, infraspinatus, teres minor, biceps and supinator longus and occasionally the serratus magnus, coracobrachialis and supinator brevis. As a rule, the lower part of the arm is not affected so far as flexion and extension of the wrist and of the fingers are concerned. There is inability to raise or abduct the arm at the shoulder owing to the paralysis of the deltoid and supraspinatus. The arm cannot be outwardly rotated because of paralysis of the infraspinatus and teres minor, and it cannot be internally rotated because the internal rotators—the teres major, the subscapularis and latissimus dorsi—are contracted, owing to lack of opposition. The arm cannot be flexed at the elbow because of the paralysis or weakness of the biceps, brachialis anticus, coracobrachialis and supinator longus; and supination cannot be carried out, owing partly to the inward rotation in which the arm is held and partly to the weakness or paralysis of the biceps and supinator longus or brevis.

The less usual lower arm or whole arm type is the result, of injury not only to the 5th and 6th cervical roots, but to the 7th and 8th and possibly to the 1st thoracic as well. Here the whole arm is flaccid; there is a wrist-drop with paralysis of the small muscles of the hand. It is usually the result of stretching of the plexus from overextension of the head in face presentation. When the lower arm and the hand alone are involved (Klumpke's paralysis), the lesion probably involves the 8th cervical and 1st thoracic roots alone. This type generally results from traction applied in a breech presentation with the arm extended, or from traction on the axilla in a vertex presentation. It is at times bilateral. With this type one often sees inequality of the pupils, owing to the fact that the sympathetic fibers from the deep cervical ganglionic plexus enter the spinal cord through the 1st thoracic and at times through the 8th cervical roots. Injury to these roots leads, therefore, to an unopposed action of the motor occuli nerve. This symptom may be seen also in adults, when the 1st thoracic root is overstretched, as evidenced by some of the cases reported by Thomas.

A rare type of bilateral brachial nerve palsy was described by Arkin and myself. The upper arms were abducted more than 90 degrees and held backward. The elbows were flexed completely, the wrists palmer flexed 75 dgrees, and the fingers flexed so that they rested on the acromions with the arms straight out from the sides. There was ulnar deviation of the hands. The treatment was as follows: Without anesthesia, the arms were gently adducted completely and the elbows extended, and the entire extremities held against the sides by swaths of cloth. Measurements were made for cock-up splints of aluminum to overcome the wrist-drop, to extend the fingers and to abduct the thumbs.

Within twenty-four hours the arms remained in a position of adduction and did not return to the abducted position when released, as they did formerly. Massage and electro-therapy were carried out twice each week, and massage alone by the mother twice daily. At the age of eight months, the child had practically normal use of its arms including the hands. In both Jolly's case and ours the injury occurred during a face presentation. We concluded that it was a case of birth palsy due to trauma of the 7th cervical root during a difficult delivery.

A roentgenogram of the entire shoulder girdle should be made immediately in every case of brachial birth palsy.

The findings in the new-born are negative except in cases in which there is a disturbed relationship between the bones of the shoulder joint, at times resembling, and at other times proving a dislocation. When the findings are abnormal, it is desirable to have stereoscopic films. Roentgen examination of one of my patients revealed osteochondritis deformans juvenilis of the shoulder. She also had a large cervical rib on the affected side.

DIAGNOSIS.—The diagnosis includes determination of paralysis, of type, of nerve involvement and of complications. The diagnosis usually presents no difficulties if one considers the history and remembers that the condition is usually noticed, if not immediately after birth by the physician himself, then by the mother, grandmother or nurse on the first day.

Inequality in the pupils implies without question an injury to the inner cord of the brachial plexus on the paralyzed side. The affected pupil is irregular.

The differential diagnosis includes: dislocation of the shoulder, sublaxation of the shoulder, epiphyseal separation, fracture of the humerus or clavicle, osteochondritis, infantile paralysis and spastic paralysis.

Injuries to the shoulder joint occurring at birth, in the early stages, may give rise to the same symptoms as brachial palsy. The course of recovery eventually distinguishes them. They have become known as *pseudo* birth palsies.

PROGNOSIS.—The prognosis depends on the cause of the paralysis. If this is due to tearing of one or more nerve roots, the prognosis is poor. If no tear has occurred, recovery will probably take place. The electrical reactions are valuable as indicators.

In all cases of upper arm type, the outcome is good, provided the case is watched from the start and treatment properly carried out. Most of the patients can raise the arm to the level of the shoulder and can use the lower arm and hand well, except for varying degrees of supination. Abduction and outward rotation are rarely regained without division of the contracted muscles, if these have been showed to contract.

In cases of the lower arm type, the outlook is not so good, although many of the patients regain use of the upper arm in spite of the persistent paralysis of the lower arm and hand. In all these cases, an exploration should be done for repair of the plexus, but even then little hope can be held out to the parents. Treatment, however, should be carried out over a long period of time. In some cases of apparently total paralysis the outcome has been surprisingly good.

In some cases the paralytic condition of certain muscles, especially of the biceps, together with the traction exerted by the weight of the arm, leads to a subluxation of the head.

It is also possible that a primary pseudoparalysis develops into a true paralysis when some of the axillary nerves become embedded in callus or in contracting scar tissue developing in the immediate surroundings of an injured joint.

The final outcome of the Klumpke type of forearm paralysis is notoriously bad. It has been claimed that a spontaneous recovery of function has never been observed.

Treatment instituted without delay in every case would leave but few instances in which the paralytic symptoms would not disappear, and would permit no infant to develop secondary internal rotation contracture and posterior subluxation of the shoulder joint.

COURSE.—The course depends on the amount of injury, the duration of the condition and the treatment. The course is long, and requires patience and perseverance.

PROPHYLAXIS. — Prophylaxis chiefly concerns careful obstetrics.

Early Treatment

The indications in all brachial palsies are: To stretch contracted tissues; to allow overstretched tissues to contract; to increase the power of stretched, weakened tissues; and to increase the circulation of weakened tissues.

The methods of meeting these indications are: correction of the deformity; application of splints; stimulation of muscles by means of the sinusoidal current; muscle education; muscle stretching and massage; and operations.

The correct position is: abduction of the shoulder to 90 degrees; outward rotation of the humerus; flexion of the elbow to 90 degrees; complete supination of the forearm; dorsiflexion of the wrist, and extension of the fingers. The best means of obtaining this position is the brace popularized by Sever. One should alternate between the aeroplane splint, the platform splint and no splint whatever.

The physical therapy includes neuromuscular reeducation, gentle massage, passive and active movements, games, rhymes and noise-producing toys: For older patients, swimming and "climbing up the door" with the fingers are valuable exercises. Active movements are the most valuable. Until they are possible, passive movements prevent fibrosis. All major positions should be assumed from four to six times daily.

The splint should be removed twice daily for the following manipulations: external rotation with or without abduction of the shoulder; full flexion and extension of the elbow; full supination of the forearm; dorsiflexion of wrist and fingers, and adduction of the externally rotated arm while the scapula is depressed by a hand on the shoulder.

In an article which appeared in *The Public Health Nurse* for May, 1930, I quoted various rhymes and songs that are helpful in maintaining the interest of small children in neuromuscular reeducation.

The child learns to exclude the affected arm. To avoid this he should be prevented from using the unaffected arm by such means as the application of a cuff, and sewing it in a pocket. A plaster-of-paris cast may be used temporarily. Muscular education is most important, and results are usually slow.

I have observed in older children whose treatment was instituted after the third year, the habit of stuttering following the application of a cast or a brace. This is probably due to a confused outlet of nervous energy. I have never seen it in children treated very early.

Orthopaedists differ as to the time during which such conservative efforts can be safely continued. Fairbank thinks that three months probably represents the limit, while Sever is willing to extend the trial to one year.

Taylor formerly advocated operation in every case, but since observing the good results obtained by the proper orthopaedic treatments, he now advises that inasmuch as deformities can be prevented by proper postural treatment, and inasmuch as nerves will regenerate even though many months have passed since injury, one may safely wait for a time, provided a correct plan of treatment is followed during the interval. If sufficient recovery has occurred during the first three months to justify hope of almost complete spontaneous recovery, then it is preferable, he thinks, to proceed with physical therapy. If, on the other hand, improvement at three months has been unsatisfactory, then, other things being equal, it is wise to expose the plexus and suture the damaged nerve ends. He has successfully performed this operation in many cases.

The disadvantages of this operation in early infancy lie in the very small field and small nerves, which make the technic of the suturing more difficult. On the other hand, the dissection is easier, because the cicatrical tissue has not become so dense.

Sharpe advises the exposure of the plexus at one month of age. He sutures the nerve ends, end to end and sheath to sheath, as carefully and accurately as possible. When the separation is greater than three or four cm., he finds it advisable to unite the ends by splicing or bridging the gap with several strands of silk, in the hope that the nerve fibers will thus be aided to grow down to the distal portion of the nerve. A portion of a nerve removed from another part of the body may be used. The anastomosis is carefully wrapped in membrane, fat, or muscle.

Late Treatment: Operative Correction of Deformities

Operation to correct deformity is occasionally necessary, and the most generally used method is that of Sever.

SEVER'S OPERATION.—An incision is made on the anterior aspect of the arm, beginning at the tip of the acromion and extending down to below the insertion of the pectoralis major. The cephalic vein is generally found in the outer edge of the wound and is tied or retracted outward. The tendinous insertion of the pectoralis major is defined, raised on an instrument and divided all the way across. The pectoralis major muscle is retracted inward, thus bringing into view at the bottom of the wound the inner edge of the coracobrachialis muscle. This muscle is defined upward until the coracoid process is reached, the arm being outwardly rotated and abducted. The tip of the coracoid process, which is usually found elongated, is completely separated from its base, together with the insertion of the coracobrachialis, the short head of the biceps and the pectoralis minor. This allows the coracobrachialis and the short head of the biceps to retract downward out of the way, and allows much freer outward rotation and abduction of the arm. The capsule of the shoulder joint is seen in the bottom of the wound, as well as the three horizontal circumflex veins. Just above the upper vein is the lower edge of the subscapularis tendon. A curved instrument is inserted just underneath this tendon, which is fairly wide at this point, and the tendon is completely divided on the instrument. This prevents any opening of the capsule of the shoulder joint, and, once this sub-scapularis tendon has been divided, outward rotation, abduction and elevation of the arm are perfectly free. The only condition then that can prevent these three movements is a considerable degree of hooking of the acromion. Such portions of the acromion as block the restoration of the head of the humerus to the glenoid should be removed. The operation is then complete and the fascia and skin are sutured. The arm is put up on a splint in an abducted, elevated, outwardly rotated and supinated position.

Steindler found that occasionally the coracobrachialis and the latissimus dorsi had to be sectioned.

In patients in whom the pronator radii teres has become much contracted, Sever divided this muscle with great increase in supination. Muscle reeducation and active and passive use of the arm begin just as soon as the stitches are out, which is in about eight or ten days, and are continued daily for three months with the arm in a splint.

There are certain postoperative conditions that may cause trouble: 1. For a year or more there is difficulty in passively inwardly rotating the upper arm or in putting the hand on the opposite shoulder. 2. In almost all cases there is limitation of rotation in the joint, which, however, is eventually overcome. 3. With the arm hanging at the side, there persists almost always a considerable rotation of the scapula in a vertical plane, even when there is apparently free motion. The cause of this is not clear. It does not impair the function of the arm, but interferes with a cosmetic success.

As supplementary to the Sever operation, Mayer advises, in addition to the division of the subscapularis and pectoralis major, dividing the teres major and latissimus dorsi.

KLEINBERG'S OPERATION.—Kleinberg found that even in the most marked cases of Erb's palsy of the upper arm type, when the patient's arm was held in outward rotation, he could bring the palm of his hand to his mouth and could reach to the opposite shoulder, the top of his head and the back of his neck; that is, he could perform many important movements. He believes that the chief cause of disability is the resistant inward rotation of the arm. He therefore holds that the essential need in the treatment is some means whereby the arm can be permanently fixed in outward rotation without the encumbrance of external apparatus. With this end in view he advises the following operation.

A vertical incision is made over the antero-external aspect of the shoulder from the acromial process almost down to the deltoid tubercle. The fibers of the deltoid are cut vertically and separated laterally, exposing the shoulder joint. A vertical incision is made into the capsule of the joint; this incision is carried down through the periosteum for about an inch and a half below the neck of the humerus. At the lower level of this cut, the periosteum is incised transversely and is elevated from the bone on the outer side. In this flap are included the joint capsule and the tendons inserted into the greater tuberosity, with a bit of the underlying cartilage and bone. It is important to keep this flap intact. This might appear to be technically difficult, but actually it is simple. The periosteum is then elevated from the inner side of the humerus. Included in this layer are the inner part of the joint capsule and the tendon of the subscapularis muscle. When these two layers of periosteum and capsule have been freed from the circumference of the humerus, the arm can be rotated outward completely and freely. With the arm in outward rotation, the outer flap of capsule, tendons and periosteum comes into contact with the anterior surface of the humerus and ultimately heals and becomes fixed at a point at least an inch, and often even a little more, in front and to the inner side of its former attachment. The inner flap is placed without tension over the outer flap and sewed to it. The wound is closed with a few interrupted chromic catgut sutures for the deltoid muscle and a continuous silk suture for the skin. To insure undisturbed healing, the arm is supported in a plaster-of-paris spica cast in abduction and outward rotation.

This operation is to be used only in cases of the upper arm type in which there is at least a fair degree of active motion in the elbow, forearm and hand. The improvement in function affects not only the shoulder, but also the elbow, wrist and fingers.

LANGE'S OPERATION.—Lange performs an osteotomy of the shaft of the humerus at about the insertion of the deltoid, and rotates the lower fragment outward, so that a condition of permanent outward rotation of the lower segment of the humerus is established. This gives a useful arm so far as supination is concerned, but does not affect the conditions of the shoulder joint; it also limits future inward rotation of the arm.

Hoffa performs the osteotomy below the middle of the humerus; Menciere in the lower third, and Spitzy in the upper third.

THOMAS' OPERATION.—In order to reduce a dislocation of the shoulder, Thomas makes a semilunar incision along the margins of the acromion, and after dividing the deltoid and exposing the upper end of the humerus freely, removes the obstructing portion of the acromion. In the great majority of cases, this is cartilaginous and can be cut with a knife. An effort is made to force the arm into external rotation and abduction and the humeral head as nearly as possible into its normal anterior position. Often, because of contractures of tendons and other tissues, complete reduction cannot be accomplished, but a considerable improvement can be obtained. Division of the subscapularis insertion is usually necessary before full external rotation can be accomplished. If tendons of the external rotator are divided at their insertion into the greater tuberosity and the cut ends sutured well forward on this tuberosity, with the arm in 90 degrees of abduction and full external rotation, these tendons thus shortened will be an important

factor later in preventing a recurrence of the dislocation.

TUBBY'S OPERATION.—The difficulty of supinating the forearm can be overcome by dividing the pronator radii teres. This can often be transformed into a supinator by joining its tendon with that of the flexor carpi radialis. This conjoined tendon is then pulled through the interosseous membrane, carried round the back of the radius and inserted on the outer side. One can also simply insert the pronator radii teres into the tendons of the extensores carpi radialis longus and brevis.

OTHER OPERATIONS.—Kleinberg has performed an arthrodesis of the shoulder joint for obstetrical paralysis. He followed Phelps, who advocated arthrodesis of the shoulder joint to hold the dislocated head in place. Even excision of the head of the humerus has been done.

I wish to emphasize that immediate treatment minimizes the necessity of all operative procedures.

Muscle Movement and Tone

A Brief Review of the Neuro Anatomy Involved, With Suggestions For Treatment

By Nicholas Gotten,* M.D., and S. Paul Campbell,* R.N., P.T.

The problem of the physical therapist in neurological cases is essentially one of changing of muscle tone. The purpose is either to reduce the muscle tone for the facilitation of movement that is retarded by the increase of tone, or to increase the tone which has been reduced that makes movement less accurate and skillful. It is therefore of utmost importance that some understanding of the complex mechanisms involved in the production of both normal and abnormal states of muscle tone be appreciated by the physical therapist when he attempts to change or alter the tone from time to time. This discussion will therefore be limited to some of the anatomical patterns of movement and muscle tone and to the changes that occur in the central nervous system that may alter the tone. The subject will be approached from a phylogenetic direction in an effort to show some of the primitive factors at work which alter tone in the human being.

Physiologically the fundamental activities of any nervous system are sensation, movement, both volitional and reflex, postural coordination, and the integration in the nervous system of the higher mental functions of association, memory, attention, etc. The function of the central nervous system is to correlate all of these activities into a unit of harmonious action.

Anatomically the nervous system has been built up over a long period of time from the lower invertebrates by additions of more important and highly specialized centers. Each addition has given a greater range of bodily movement with increasing possibilities up to mammals, and in mammals the addition of cerebral hemispheres allows a still wider range of possibility in movement by the factor of a motor cortex and by ideation. In the lower forms of life the first sign of a central nervous system is in the segmented worms. The nerve cells are separated from each other by synapses, or membranes. Each segmental neurone supplies a segment, but connects with the segment above and below it. The segments are correlated by the action of a primitive brain, although movement and activities of one segment can go on without the involvement of the other. Such a primitive brain greatly restricts the activities of the organism in all phases. Their behavior and movement are fixed and are dependent upon the simplest of tactile and visceral impressions. Obtaining greater range of movement and behavior necessitated a greater development of nervous tissue. This development has gradually taken place in a phylogenetic order by the addition of cerebral hemispheres.

The primitive hemisphere in the vertebrates is the striate body. The striate body in the lowest forms of fishes represents the highest center for the correlation of motor impulses. The motor impulses are limited to continuous swimming movements of the body and fins and are characterized by two prominent features: the constant rhythm of movement, and the automatic continuous character of the movements. The movements continue whether the animal is in motion or not. All of the body segments cooperate with the related segments and the transmitted impulses give undulating movements in sequence. These movements are not under control and are automatic and fixed.

The assumption of terrestial life necessitated an alteration or inhibition of these continuous movements which were now a disadvantage to locomotion and caused a dissipation of energy when at rest. The primitive brain or corpus striatum required a check on the continuous movements, and this necessity resulted in the development of the neo-striatum. In the reptiles, which are in the next order of vertebrate development, we still see the undulating movements characteristic of fishes, but they are not in constant motion and may be quiescent for long periods of time. The organ for control of these continuous movements is the neo-striatum. This organ apparently checks the constant rythmical movements of this order, except when motion is required. As greater needs for specialized types of movements, as well as inhibitory forces, were required, we see further expansion of the corpus striatum. For example birds, who needed motor specialization for flight, such as the associated action of oscillation of wings, the synchronous oscillations of these wings, the adduction and extension of the legs beneath the tail and the fixation of the tail in flight.

A still further expansion and specialization for the combination of automatic movements has occurred as a result of these needs. We can also see these automatic associated movements in the running of the horse or dog. There are a remarkable number of associated movements preserved in man that are carry-overs from our earlier nervous development. There are three common ones that are easily distinguished and it might be well to name them here as their loss is associated with several nervous diseases frequently encountered. They are: (1) The synchronous swinging of the arms in movement with the legs in walking, which harks back to the automatic associated movements of the

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quadruped in running. (2). The associated movements of the arms and legs in rising or in turning. (3). The associated movements and cooperation of muscles of the trunk and neck in standing, walking or running, etc., determining the position of the head to the body.

The development of the cerebral hemispheres or what is commonly called the brain, established a still greater control of the fixed primitive movements. This addition allowed a vast improvement over the fixed primitive behavior pattern and limited motor functions of the lower animals, and gave to this group greater possibilities for development of skilled movement and range of activity. In this neo-pallium or brain there developed a specialized motor cortex which immediately made possible this wider range of activity. In reality, it established a more effective control over the primitive automatic system. As we go up the scale in the mammalian order, we find that new motor cortex has gained more and more control and each time has suppressed and submerged the automatic associated movements. When this motor cortex is defective, the more ancient motor mechanisms reassert themselves. For instance, in an infant with paralysis, we may see the old primitive more or less constant movement called athetosis develope. In disease of the globus pallidus of the neo-striatum we see primitive influences in the rhythmical tremor and lost automatic associated movements. The tremor is present only at times of movement and emotional excitement, and disappears during rest and quiet. In another area of this ancient corpus striatum, the putamen, which however is higher in developement than the one just mentioned, when defective gives constant rhythmical movements and an increase of tone.

One other organ of the brain, which though mentioned last has a great influence on muscle tone and movement, is the cerebellum. Animals capable of only limited movement have a very small cerebellum, while those of greater range of movement have a very large cerebellum. For instance, in reptiles whose range of movement is not great and no great effort is required in maintaining posture, the cerebellum is small. Birds however have a large cerebellum. In man the cerebellum attains the highest known developement.

The cerebellum's function is the association of impulses in maintaining the muscles of the body in a state of harmonious innervation and the coordination of the various body segments with each other. Synergic control, (the acting in unison of one group of muscles with the other and all in the proper tone) is necessary to skilled and precise acts. The cerebellum receives the impulses from the skin, tendon, muscles, labryinth, etc., as to what is the position and tonus of the various muscles and then sends out impulses that maintain the proper tone of the muscles for posture and for carrying out the movement that is desired. There are therefore two functions of the cerebellum, one of maintaining tone for posture and the other of synchronizing movement or changing its position in space. These two forces are intimately associated with all bodily functions concerned with the musculature.

Having very hastily sketched some of the important factors in the developement of the parts of the brain that have to do with movement and the maintaining of tone, a few words are now devoted to the individual muscle. The muscles of the body are normally maintained in a state of tonus or slight tension when at rest. This tonus is regulated by the impulses from the skin and muscles and tendons, which impulses are transmitted to the brain and the proper tone is adjusted for the act. This constant tonus allows for quick and coordinated movements. Before a movement is produced, not only must one muscle contract, but the opposing muscle must be slightly inhibited or relaxed in proper time interval, and when that movement has been obtained, the tone must be altered to enter into a new tonic contraction for maintaining the limb in the new position. The loss of tone and posture energy results in ataxia, tremor, nystagmus, etc. This means that the tone of the muscles is so altered that the muscles do not function as a unit of muscle groups, but in jerky unassociated movements. There is a loss of the guiding and checking forces, these guiding and checking effects being of great importance in accomplishing precise movements.

Another important system in the regulation of muscle tone has been mentioned. This is the proprioceptive system. Sensations that come from the muscles, joints, skin, and tendons as well as from the vestibular apparatus tell the cerebellum and higher centers what is the position of the muscles and the tone, so that it can be altered as is necessary. We can now begin to see the many complicated structures that are concerned with tone. The spinal arc of the cord sends out continuous tonic impulses to the muscles. These are regulated by the impressions that are received from the skin, muscles and joints. At the same time the corpus striatum is sending down its continuous rhythmical impulses, but inhibited in part by impulses from the motor cortex of the cerebrum. The minute changes for proper tone are being maintained by the cerebellum, and all of these factors are working in unison to keep the best tone for the widest range of muscle movement.

Lastly, in maintaining of muscle tone, there is one important center of the nervous system that deserves the physical therapist's greatest attention. This is the sympathetic or autonomatous system. This is a part of the central nervous system and is a carry-over from the primitive nervous system in many respects. It comprises a group of neurones which carry impulses to the muscles and glands of the body and to the blood vessels. The nervous impulses of this system work, in a sense, automatically in the control of the size of the vessels, but from having received a stimulus from sensation somewhere within the body. The neurones of this system lie just outside the spinal cord and are connected to the nerve roots. Injury to this system results in a corresponding loss of tone of the muscles. This tonic loss has been found to be due to the nutritive effects that occur, that is, from changes in the size of the blood vessels. By stimulation or depression of this system, there is a corresponding difference in the fatigue time of the muscle with a more or less rapid recovery from fatigue that is produced by work. Stimulation of the center increases the blood supply, which decreases the fatigue and makes recovery quicker. Likewise, when the center is depressed fatigue is quicker and the recovery more slowly accomplished.

With this information concerning the production and maintaining of tone by the various centers of the brain and cord, mention will be made of a few of the diseases of the nervus system that are concerned with changes in tone.

Peripheral Nerves—Diseases or injuries of the peripheral nerves result in a loss of tone, with a flaccid type of paralysis. Such a condition may result not only from injury but may be due to drugs, infections, alcohol, etc. In the partial injuries or in the neuritides, the loss of tone may be of varying degree.

Posterior Root—Diseases of the posterior root result in a loss of the impulses from the skin and joints, so that the centers do not know what is the position of

the muscles nor their tone. This allows a relaxation of the tone, and results in ataxia. This is observed in tabes dorsalis and other infections of the posterior root or the ganglion.

Spinal Cord—Anterior horn—Diseases of the anterior root of the spinal cord leave sensation unimpaired, but the motor impulses for the production of tone and the contraction of the muscle are impaired or paralyzed. Examples are poliomyelitis and spinal muscular atrophy. There is a flaccid paralysis, atrophy of the muscle and a loss of tone. Diseases that affect the cerebellar pathways of the cord cause a disturbance because the cerebellum does not receive the impulses for the position of the muscles nor their tone, and therefore does not send down the proper nor continuous impulses that produces a smooth movement. Likewise the fixation of a muscle group in a given position is not as easily held. This condition is seen in cases of hereditary cerebellar ataxia, vascular lesions of the cerebellar arteries, tumors of the cerebellum, or those affecting the cerebellar pathways, and diseases of the internal ear, which affect the vestibular impulses to the cerebellum. Pyramidal tract diseases or those of the posterior columns give an increase in tone because the inhibitory forces on the spinal cord are not present, allowing the spinal cord arc to function without a check. The muscles become spastic and stiff. This condition results in multiple sclerosis, pernicious anemia, syringo-myelia, etc.

Lesions of the brain causing spasticity—Here the most common condition is spasticity due to occlusion of a vessel, or to hemorrhage. Occasionally a tumor may give the same picture, but is not often confused with the vascular type. The result is a spastic paralysis, with increase of tone, since the inhibitory forces of the motor cortex have been removed, allowing the lower centers and the spinal cord to act without inhibition.

Rigidity—Rigidity is produced by lesions of the basal ganglion, due to infections, degeneration, arterio sclerosis, etc. The most common types are the post encephalitis group and the Parkinson's disease seen in older people. Here the primitive brain once more becomes dominant over the inhibitory levels of the higher centers. The result is the continuous tremors, loss of associated movement, and increase in tone.

Lesions of the muscles producing tonic changes—These are usually few in number, but the most common type is the myotonia conengita, the pseudo hypertrophic muscular dystrophies, etc. The changes in tone and movement here are due to disease in the muscle itself or in the neuro-myo junction.

The physical therapist's problem then, is not in reaching these nervous centers, but to change the tone of the muscle, depending on the pathological condition, and to keep the nutrition of the muscle in the best possible state. Thus atrophy is reduced, rigidity, spasticity and fatigue are diminished, mainly by increasing the circulation and aiding lymphatic drainage. The maintaining of contractility, irritability and nutrition of a muscle may be a very difficult problem for the physical therapist. When the muscle is not used it will atrophy, and weakened and paralyzed muscles are difficult to use. Where disuse atrophy has resulted it can be returned to normal by radiant heat, massage, passive movement, followed by exercise. When the paralyzed part is an extremity, the active exercise may be performed in a bath tub partly filled with warm water. The exercises are gradually increased until the individual can perform them unassisted. This type of treatment stimulates the vasomotor end organs and causes an increased blood supply to the part and results in a more normal metabolism and facilitates restoration of function. The atrophy of disuse may simulate a complete paralysis, but is recognized by having no reaction of degeneration. If the atrophy is of long duration, muscle degeneration may be well advanced or extreme.

A paralysis of the flaccid type, due to peripheral nerve involvement gives a complete loss of tone of the muscles involved and a contraction of the antagonistic muscles which causes a stretching of the paralyzed group. Treatment should be directed to prevention of deformity and preservation of the muscle in good condition until regeneration has taken place. No physical procedure will hasten the recovery of the nerve, but it helps prevent extreme atrophy by maintaining the nourishment of the muscle. The physical treatment should be radiant heat, massage, passive motion and underwater exercises. Diathermy, properly applied will flush the deeper structures with blood. Stimulation of the muscle tissue directly may be performed with the slow sinusoidal current. Fatigue of the muscle must be avoided. In this type of case occupational therapy is of value by giving practice in precise movements The paralysis caused by alcohol, drugs, infections, etc., may be treated in the same manner, the intensity of the treatment varying with the degree of the injury.

In diseases of the posterior root of the spinal cord there is a block of impulses from the skin and joints to the higher centers. The most common example is tabes dorsalis. The patient walks with a scythe-swinging, steppage gait for he is unable to determine the position of his extremities in space. Often associated with tabes are lancinating lightning pains. The aim of the treatment is to reeducate the muscles for coordination and to alleviate the pain. Walking exercises are of considerable value. The floor is marked off in squares with chalk, and the patient instructed to step in each square. For the upper extremity, placing of pegs in holes is also a good exercise. Diathermy is of value in the relief of pain, but great caution must be used where there is a loss of sensation, or burns, will result. The technic must be exact and the sensory loss must be estimated before using diathermy.

In the diseases of the anterior horn of the spinal cord sensation is normal, but the impulses for the production of contraction and tone of the muscle is impaired or paralyzed. The paralysis is limited to the segments or roots involved, and atrophy takes place in the muscles supplied by the corresponding nerve cells. The contractile elements of the muscle disappear and are replaced by fatty or fibrous tissue. Clinically there is electrical reaction of degeneration, which appears in ten to fourteen days after injury. The best example of this flaccid type of paralysis occurs in acute anterior poliomyelitis. This disease is quite familiar to most physical therapists. The form of treatment used is radiant heat, and very gentle massage *after* the acute stages are over. Later, exercises may be given under water, or in some other form in which gravity has been reduced to a minimum. Great care must be used not to allow fatigue. Treatment attempts to keep each muscle that is paralyzed from atrophying and to prevent its antagonist from overcontracting. Light massage and heat properly administered will maintain the nutrition until the nerve cells that have not been destroyed can resume their function. Electricity is sometimes used with good results. The slow sinusoidal current produces a mild contraction of the muscle without painful skin effects and

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proves to be a real stimulant to the metabolism, but again, fatigue must not be produced.

Diseases of the pyramidal system produce the greatest increase of tone or spasticity that the physical therapist is called upon to treat. Treatment has to be directed toward overcoming the spasticity by the methods of relaxation at his disposal, and toward the prevention of contractures by active and passive movement. Hydrotherapy, in the form of the continuous warm bath or the electric cabinet bath combined with the warm fan douche, will help relaxation. Massage and passive motion aid in alleviation of the spasticity, and in prevention of contractures. Occupational therapy and re-educational exercises are important adjuncts to the treatment. Spastic paralysis may be due to disease or injury of the pyramidal tracts, or to the motor cortex of the brain. The spasticity is due to the "brake" being removed from the spinal reflex arc. As a result, there is a hypertonus without atrophy (except disuse atrophy). The muscles are in a state of constant contraction, often with deformity, due to the overcontraction of the stronger group, usually the flexors. Unless early treatment is instituted, contractures and deformity may be extreme. No therapy of a physical nature has any actual curative effects in these conditions. The main objective is to keep the paralyzed muscle in as well a nourished state as possible until such time as the nervous function might return. When there has been a sufficient return of function to permit active movement, the patient should be encouraged to use the extremities as much as possible in a way that all muscle groups are exercised.

The treatment of the rigidities, such as occur in post encephalitis, Parkinson's disease, etc., (basal ganglion disease) is essentially the same as in the spasticities, that is, methods of overcoming the rigidity of the muscles so that movement is more easily accomplished.

Diseases of the muscles are treated best by active and passive movements, and by the use of the faradic current. In this type of condition occupational therapy is of especial benefit, in training coordination of the muscles, and in preventing further disuse atrophy. This treatment should be augmented by continuous baths, electric cabinet baths, and electro-therapy, to assist the muscle function and metabolism.

Philadelphia, Pa.

Physical Therapy in the Treatment of Cardiovascular Diseases*

By James Alexander Lyon, M.D., F.A.C.P.

The use of physical therapy in the treatment of cardiovascular diseases may at times result in the abatement of symptoms which frequently accompany these conditions. It has not as yet been demonstrated, however, that the use of a physical agent will check the course of disease or give complete relief from cardinal symptoms. Physical therapy must, therefore, be considered an adjunct to other methods of treatment. In spite of this limitation, its value in its own field is at times considerable.

Massage.—The physiological effects of massage upon the dynamics of the circulatory system have not as yet been demonstrated experimentally. In clinical experience, however, massage has been proved a useful agent in the alleviation of symptoms which are sometimes associated with cardiovascular diseases. For those patients who because of cardiac weakness are forced to lead a life of physical inactivity, massage has a special value in partially compensating for a lack of customary exercise. It aids in maintaining normal muscular and circulatory vigor in bed-ridden patients and improves their sense of well being. It is, also, as Thayer pointed out, an essential means of preventing muscular softness during the several weeks of complete rest which patients with cardiac infraction must submit to. Patients having neurocirculatory asthenia or effort syndrome, and elderly patients who have adopted sedentary habits are frequently benefited by massage which gives them increased energy and tone. In rheumatic heart disease when the patient is unable to take exercise, massage may aid the circulation and provide muscular nutrition. Pemberton has suggested that in cardiac decompensation with edema, properly given massage may aid in returning tissue fluids from the periphery to the general circulation. He warns, however, that massage might induce toxemia from too rapid resorption of the body fluids.

Colonic Irrigations.—Certain cardiovascular diseases are at times accompanied by unrelated symptoms, which in some cases are caused by toxic products lodging in the bowel above the area of defecation. In these cases an improved general condition may follow colonic irrigations.

Hydrotherapy.—Hydrotherapy has a restricted application in the treatment of cardiovascular diseases. The general effect of hydrotherapy upon the circulation being one of vasodilatation, it is sometimes used in cases of hypertension and arteriosclerosis. Norris cautioned against the use of too frequent or too vigorous hydrotherapeutic measures since they tend to decrease the nerve tone and may even do actual harm. As momentary constriction of the vascular system follows the systemic application of either cold or hot water, cardiac patients should not be subjected to baths of extreme temperatures because of the sudden changes produced in the circulatory equilibrium and the consequent cardiac strain. Medicinal baths, especially when taken at a resort, have sometimes seemed temporarily to benefit patients having impaired circulation. White has pointed out, however, that the beneficial effect sometimes obtained probably comes from the rest, relaxation, and change of scenery which the patient is enjoying while taking the course of baths at a spa.

Thermotherapy.—The application of extreme heat as a therapeutic measure in the treatment of cardiovascular diseases must be made with caution. Experiments have shown that the cardiac output per minute increases with the rise in temperature to which the individual is subjected. This increase probably represents the peripheral dilatation occurring under the influence of heat. Exposure of a cardiac patient to high temperatures may in-

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duce circulatory failure, vascular rupture, and, in arteriosclerotic subjects, syncope or anginoid pains.

Diathermy.—In the treatment of cardiovascular diseases, the use of diathermy is limited to those conditions in which heat gives relief from symptoms. In experiments carried out upon human subjects and upon animals no significant changes were obtained in blood pressure levels either during or after the application of diathermy. It has been pointed out that where there are pathological changes in the blood vessels, increased blood pressure may be a compensatory means which should not be interfered with, even if it were possible to appreciably reduce the blood pressure level.

Diathermy has been used in the treatment of angina pectoris, but the reports of actual results are meager. A psychic or subjective improvement may possibly follow diathermic treatment in cases of anginoid pain when the underlying cause of the pain is a hypersensitive state of the central nervous system and a generally depleted condition of health. But complete and accurately kept records of a series of cases of true angina pectoris treated by diathermy are lacking, and the evidence is at present insufficient for the acceptance of diathermy as a therapeutic agent in angina pectoris.

Coulter has stated that the hyperthermia produced by diathermy and hot baths relaxes the spasm in arterial spastic disease and improves the circulation in early cases of peripheral vascular occlusion.

Summary

1. Massage is an important adjunct in the treatment of patients who are inactive because of cardiovascular diseases.

2. The use of colonic irrigations is of value in the treatment of cardiac patients in whom toxic products have accumulated in the upper part of the colon.

3. Hydrotherapy and thermotherapy should be used with great discretion, if at all, in cases of arterial hypertension and arteriosclerosis. They are contraindicated as therapeutic measures in heart disease per se.

4. Diathermy has a very limited application in the treatment of cardiovascular diseases, and the subjective improvement which has occasionally followed its use is temporary.

Washington, D. C.

Hyperpyrexia*

By J. R. Merriman, M.D.* and S. L. Osborne, B.P.E.

At the present time a great deal of work is being done to evaluate hyperpyrexia by physical means as a therapeutic procedure. This will, no doubt, supplant many forms of foreign protein therapy. There is a wide variety of these proteins in general use, such as, milk aolan, peptone, sulphur, omadin, typhoid vaccine and mixed vaccines. Production of a higher rise in temperature over a longer time and under control appears to be decidedly better where hyperpyrexia is indicated.

For some time we have conducted a careful investigation to determine the comparative merits of the various methods employed for the production of fever. We have used water, electric light cabinets, infra red cabinets, high frequency currents, ultra high frequency currents and electric blankets. As far as practicable, each patient was subjected to the same number of treatments by each of the various methods, and their reactions were noted. Most of our patients were suffering with arthritis of the infectious type and had failed to respond to other forms of treatment. For the most part we avoided those who had cardio-vascular disease for they do not tolerate well the rather strenuous treatment. They came to the medical school early in the morning, were given their treatment and then sent home that evening. Several of the patients depended entirely on the street cars for transportation. We wished to test out this ambulatory form of treatment that might be given in an office or clinic outside of a hospital. It proved perfectly safe. The shorter curve of four hours at above 104° did not prove to be as satisfactory as the eight hour curves given in the hospital, but were very much worth while.

The temperature attained by the various methods was held by using the treatment bag described by Feinberg, Osborne and Steinberg (1). Without such a bag it is difficult to hold the desired temperature. It also makes it unnecessary to employ numerous heavy blankets which exhaust the patient. We make a record of pulse, respiration and rectal temperature every fifteen minutes except in water, where we make a record every five minutes until the temperature reaches the desired level. We use electric indicating thermometers so that the temperature is kept constantly under observation.

Diathermy: In giving treatments by means of diathermy we use the technique first described by Neymann and Osborne (2). This method appears to be the most comfortable for the patient. This comfort has a physiological basis because the heat is induced in the tissues instead of being conducted through the skin which is much more heat sensitive. It also has the advantage of being under control at all times. The cooler skin temperature probably makes this procedure safer. Some excessively fat people do not stand diathermy well by the usual method for it causes hard painful nodules under the skin and especially in the large, fat breasts of women. This can be avoided by the cuff method of application. In order to speed up the rise in temperature, two or three ordinary electric heating pads may be placed inside the bag with the patient. These are used only to heat up the bag and blankets and are left on about one-half hour.

External heat produces a skin temperature higher than that of the internal organs and remains higher until the patient begins to cool off. This difference is of no concern with the robust patients, but is not so safe for those who have chronic ailments which have markedly lowered their vitality. In these cases the induced heat is more desirable.

Kahler and Knollmeyer (3) in 1929 were the first to report the use of an electric light bath for the production of fever. They secured and maintained a temperature of 104° F. for approximately forty minutes in the treatment of general paresis and arthritis deformans. We use an electric cabinet made in two sections and placed on the

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bed over the patient. This cabinet contains 16, 60 watt incandescent lamps mounted 21 inches from the patient's mattress. Over this cabinet, blankets are placed to maintain the heat. Particular care is taken to insulate thoroughly around the patients neck protruding from the cabinet. Large individuals will obviously have part of their body closer to the lights and will become uncomfortable from the close contact to the heat. The discomfort can be lessened by hanging a thin blanket as a tent between the lights and the patient. The blanket should not touch the patient except possibly at the sides, for it also becomes quite hot. When the desired temperature, usually 105° rectal, is reached, the cabinet is removed and the patient is enclosed in the heat insulating bag which is also in the cabinet and heated with the patient. If the patient is insulated thoroughly, his temperature will continue to rise for another degree or so, and will remain above 104° for eight hours or more, with no further addition of heat. If the patient fights the restraint in the bag his temperature might continue to rise to a point of danger. The patient may be left in the cabinet and his temperature maintained by turning off and on some of the lights or by using a rheostat to regulate the current in the lamps. This continued exposure of the skin to the heat of the lamps is more uncomfortable than the bag. He is much more at ease in the bag where he knows no more heat will be turned on. The infra red baker acts in much the same manner as the electric light cabinet, but appears to be more uncomfortable for this heat is not as penetrating as the radiant heat.

The oldest form of hyperpyrexia is the use of hot water. The Greeks and Romans had elaborate bath places for treatment of diseases. Scattered over the world there are many bath places developed around natural hot springs. Many of these are controlled by the various governments. In 1927, Shamberg and Tseng (4) and in 1929, Mehrtens and Pouppirt (5) published their clinical results employing hot baths to produce fever. These workers were able to secure rectal temperatures of 105° F. and maintain them for two hours. We have easily maintained this temperature for eight hours. We use a water bath at 110° F. When a rectal temperature of 105° F. is reached, the patient is quickly removed from the water and placed in the treatment bag mentioned above. It takes from fifteen to forty minutes to reach the desired temperature. This depends on the size of the patient and the number of treatments that he has had previously. The temperature rise in larger patients and in those who have had several treatments is slower as might be expected. To maintain this temperature the treatment bag must be pre-heated to prevent a decrease in the patient's temperature on placing him, therein. For this purpose we employ three ordinary electric heating pads for about one-half hour or while the patient is in the water.

It is very dangerous to employ this method unless an electric indicating thermometer is used, for the temperature rises so fast. Records are made every five minutes and when it reaches 103.5° it is kept under constant observation to guard against too high a temperature. While this is the quickest method it is the most uncomfortable while the temperature is rising, as well as the most dangerous. Some patients, in spite of the marked discomfort, preferred to battle it out because it meant a decided shortening in the treatment time. The quick temperature rise, lack of skin elimination and hydrostatic pressure all tend to add to the patient's discomfort.

In 1931, Wilgus and Lurie (6) reported the use of electric blankets for the production of fever. For two years we have been experimenting to produce an electric blanket safe for use. It is our opinion that the use of such a blanket is a dangerous and hazardous procedure. It is the slowest and by far the most uncomfortable and exhausting method so far described. The blanket may be used either inside or outside the bag and we have used both. When used inside, the temperature rise is more rapid, but the patient has greater discomfort and there is more danger of burning, especially over the sacrum. The perspiration runs to this region causing maceration and blistering. The patients bed temperature should not exceed 120° F. at any time.

We are experimenting with the ultra high frequency current. So far, it appears to be unsafe on account of the frequent burning of the patient. The original cost and the upkeep are rather high at this time. The hot air blowers and electric light cabinets used by some for the purpose of keeping the patient dry could be modified a little and used alone for raising body temperature without the extra cost and trouble.

We encourage our patients to drink as much water as they wish during the treatment. This usually runs from two to four liters. Many of them become quite nauseated. This has been attributed by Simpson to the loss of chlorides. Following his suggestion we are adding six grams of sodium chloride to each liter of water for drinking. This has proven to be of decided value. When the temperature reaches about 102° we usually give one-fourth grain of Morphine hypodermically. The pulse rate is a good index of the patient's condition and should not exceed 160. A pulse of 120 to 140 is to be expected with a temperature of 104° to 105°. A sudden drop in pulse rate with the temperature remaining up, is a danger signal. The respiratory rate is little changed unless the patient becomes excited. A sudden cessation of perspiration or a pallor around the mouth may be the first indication of peripheral circulatory failure.

Conclusions:

1. Various agents used in production of fever are evaluated.
2. An artificial fever of 104° F. or higher was induced in twenty patients and held for four hours.
3. Patients were able to return home the same day and had no ill effects.
4. A four hour temperature curve of 104° F. is less effective than an eight hour curve in the treatment of infectious arthritis.

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Physiotherapy and Infections of Hand

By Earl A. Bowen, M.D.

The treatment of infections of the hand may be divided into two parts:

1. Adequate drainage.
2. Restoration of function.

Part one is the province of the surgeon and he should approach his problem with the same seriousness as he does a laparotomy. He must know when to cut, where to cut, and how much to cut in order to prevent the spreading of the infection with its consequent deformities or possibly the death of the patient.

Next, he must not keep up wet dressing too long, resulting in boggy tissues, because if the incisions have been properly made, forty-eight hours of constant moist dressings is sufficient for the majority of cases. Then dry heat in the form of a cradle of electric lamps should be applied three hours daily.

Now for part two. After five days, the infection should be under control and the physiotherapist should be called in. The problem of restoration of function should not be delegated to the nurse because she has neither the training, experience, patience, nor enthusiasm for this kind of work. At this time, the surgeon should remind both physiotherapist and patient that except during manipulation the hand should always be maintained in the position of function i. e., like the hand of a baseball player grasping the ball.

All early procedures of passive and active motion should take place in a saturated solution of boric acid at 110° F. gradually working up to a period of thirty minutes. When all incisions are healed the whole arm should be thrust into a whirlpool bath at 110° F. for thirty minutes. This bath loosens up adhesions and should be followed immediately by massage, and passive and active motion for another thirty minutes. This last treatment should be given at least three times a week. In order to sustain the morale of the patient, it is wise to recommend home exercises such as playing tennis, using the typewriter and squeezing a soft rubber ball.

In conclusion, let me emphasize three points:

1. Proper incisions should be made to insure adequate drainage.

2. Constant wet dressings should be discontinued on the third day, and dry heat instituted.

3. The physiotherapist should be called in after five days and if this is done, convalescence will be measured in terms of weeks rather than months.

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The Early Orthopaedic Treatment of Infantile Paralysis*

By Walter P. Blount, M.D.

The orthopaedic treatment of poliomyelitis is concerned not only with correcting deformities, but with preventing them. It should begin, not after deformities are present, but as soon as the patient is paralyzed. Rest is the greatest single factor in treatment, and physiological rest is obtained only by proper splinting. Good care will do much to lessen the severity and duration of tenderness. Irreparable damage to weakened muscles may result from over-stretching them—and this over-stretching is prevented by proper splinting. Most contractures may be prevented by early splinting and constant supervision of the posture in bed.

The Acute (Tender) Stage

If the paralysis is extensive, the patient should lie on a firm mattress which does not sag in the middle. Weak springs may be improved by laying table leaves or similar boards between the mattress and the springs. Foot drop may be simply prevented by placing a box or a board upright at the end of the bed and holding it firmly against the feet. If the knees sag into "back knee" in spite of the firm mattress, they must be supported by a folded towel or small blanket. Slight flexion is prefarble to hyperextension.

The recently paralyzed arm should be supported by sandbags and pillows at right angles to the body, rotated somewhat outward, with the elbow flexed to 90°, and the wrist bent slightly backward. The patient with a tender arm will soon become accustomed to whatever position is first assumed, and will resent any attempted moving. It is well, therefore, to start with this routinely desirable position, and maintain it until muscle tests later indicate a change. Early testing of the power of tender muscles serves no purpose and is not only painful to the patient but is actually *harmful* to the muscles themselves.

During the tender stage, the patient should be handled as gently as possible. The skin should be kept clean, but bathing should not be vigorous enough to cause pain. Massage is not to be thought of for many weeks. In all of the nursing care, the position should be disturbed as little as is consistent with the prevention of bedsores. Heat often relieves the tenderness, and is of benefit in stimulating circulation. A heat lamp with a carbon filament is convenient. Hot moist applications are also good. Whatever method is used, one must be careful not to overheat the part. Water bottles and electric pads are undesirable because of their weight. After a few weeks warm baths are grateful if the patient can be easily transferred to a large tub.

As the muscles lose their tenderness the patient may be turned. With the toes hanging over the end of the mattress there is no tendency to foot drop, and there is no discomfort or deformity caused by the weight of the bedclothes. Lying on the abdomen is particularly desirable in cases with weak abdominal and back muscles, and is effective in counteracting the beginning of scoliosis. In this position there is no tendency to hip flexion deformity. An existing contracture of this type may often be corrected surprisingly well by regular periods of lying prone with a twenty pound sandbag on the buttocks.

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These simple measures are not long sufficient to maintain the correct positions, however, and splints are necessary. A simple, metal, right angle splint is commonly used to prevent foot drop. It is cheaply made of heavy iron wire with a sheet metal foot plate. If a good deal of infantile paralysis is treated a variety of sizes may be kept on hand for immediate use. For the occasional polio a splint may be quickly supplied to measure by a bracemaker or blacksmith. The metal frame is covered with towels, which may be changed when soiled. The cloth conforms to the shape of the calf but does not cover the heel. Metal loops project at the angle and support the splint so that there is no danger of pressure on the heel. A strap over the instep holds the foot securely in place.

Applying the splint to the leg is a simple matter if there is no deformity. The foot readily comes to a right angle and is strapped securely but not too tightly in place. If there is already some foot drop, the angle of the splint may be temporarily changed to conform to the foot. Then as the contracture yields, the splint is again gradually bent to a right angle. Later the angle may be increased if muscle tests show that calf muscle is weaker than the dorsiflexor group. The tightness of the towels is so adjusted that the heel does not rest on the bed. It is important to have the foot plate considerably longer than the foot so that the splint will hold up the weight of the bedclothes.

For general use, a simple wire splint is to be recommended. A flat foot or club foot is a frequent deformity of infantile paralysis, however. Such a splint is then a good temporary measure but should soon be replaced by one which will hold the foot turned inward or outward.

Plaster of paris is excellent material for this special splint. Knitted stockinette forms a soft, smooth foundation. A suitable size is rolled and applied to the leg. For the greatest efficiency the splint is not otherwise padded except for a small disc of felt which is cut for the tip of the heel. A reinforcement is made by laying folds of one plaster bandage back and forth on a smooth surface. The layers are well rubbed together for strength. When completed, the reinforcement is cut about one-third through on either side of the heel. With the felt pad in place over the tip of the heel, the plaster is quickly moulded to the leg before it begins to set. Overlapping of the cut edges at the heel avoids wrinkles and adds to the strength of the splint. Circular turns of plaster are then applied in the usual manner. The splint need not be heavy. Two six inch bandages in addition to the reinforcement are usually sufficient for an adult, and one is plenty for a child.

During the application of the plaster the assistant supports the knee with one hand, and by holding the toes with the other, keeps the foot in the correct position. While the plaster is setting it is moulded to conform to the body contours. If the splint fits accurately it is more comfortable and there is no danger of pressure sores.

When the plaster has set the front half of the cast is trimmed away, leaving a posterior shell. The redundant stockinette is folded back over the edges and secured with plaster of paris or adhesive. The completed splint should be dried several hours before it is used. It should be perfectly smooth inside. The pad in the heel is securely embedded and forms a cushion at this pressure point. An elastic cotton bandage holds the splint in place without danger of constriction.

If the paralysis of an arm lasts more than a week or two, an aeroplane splint should be supplied for use in bed, and later when the patient sits up. The arm is comfortably and securely held at a right angle to the body, slightly forward flexed, and with the elbow more or less than a right angle is indicated by the relative power of the triceps and biceps. Additional splints for the fingers may be added if necessary. This outfit is worn day and night and removed only for bathing. Even then the arm is not allowed to hang down at the side but is supported in the same position by the attendant or the edge of the tub.

The Convalescent Stage

Only when the muscle tenderness is entirely gone can exercises be started. Gentle movement under water at a temperature of 95° to 98° F is an ideal beginning. (1) The water warms cold muscles. It buoys the extremities so that gravity is counteracted and free play of the individual muscle groups is allowed. The danger of over-fatigue is lessened. Later the resistance of the water builds up muscle power. Exercise of the arm is permitted in a special orthopaedic tub which is so shaped that a physical therapist may stand near the patient and accurately control the movements without straining her back.

If the patient is almost entirely paralyzed, so that he cannot complete the arc of motion, he must concentrate on the motion while the physical therapist completes the arc for him. Only one muscle group is exercised at a time.

While the patient is still confined to bed, sling suspension exercises are well combined with those in the tub. The extremity is placed in a padded sling which is hung from a frame or the ceiling. Under the supervision of a physical therapist or a trained mother the legs may be exercised. Over-development of already strong muscles at the expense of weak ones must be avoided.

For work on the individual muscles the physical therapist uses a broad table with a padded, leather-covered top. Motion is always controlled by the physical therapist who aids or resists the patient as required. With the patient on his back, hip exercises may be performed with slight resistance from the physical therapist. One must be careful to avoid straining the knee backward. Knee exercises on the table require the patient to lie on the affected side, which is opposite to the rule in the water. This position is also good for developing hip muscles with friction of the table top offering resistance to a partially recovered muscle.

If a physical therapy department is not available, the later treatment may be carried out by the well trained visiting nurse or mother at home. A child is given a warm bath and simple under water exercises in an ordinary tub. With children, muscle-training is easier on the kitchen table than in bed. The leg is first warmed with a heat lamp, because feeble muscles often cannot work when cold. Then the leg is gently massaged. The light strokes are mainly with the heel of the hand. Massage should always be away from the hand or foot, that is, toward the heart. Then powder is sprinkled on the smooth surface to eliminate friction, and the exercises performed with gravity largely eliminated.

After a few months of physical therapy, more activity must be permitted. Swimming and walking in the water may be allowed earlier than walking with braces. Small tanks or indoor pools may be adapted for the purpose. More active movements under water prepare the patient for swimming. Later come the actual motions of swimming with the patient lying on a board or plinth. When the form is mastered, the patient is supported by an air ring or an over-head sling and allowed to practice the strokes in deep water.

The time to allow walking varies greatly. It would be ideal if the patient with extensive paralysis of the lower extremities could be kept from walking for a year or more, but circumstances alter cases here as in all medical treatment. Braces should be worn when the patient first gets up. They have three main functions.

Most important at first is the protective one. Muscles which are weakened by poliomyelitis will soon become tired and overstretched if they receive the whole weight of the body. Braces share the strain of weight bearing and when there is a padded ring at the hip the weight of the body is borne directly on the brace. Then some patients who would otherwise be confined to bed or a chair because of weakness, are able to walk when braces act as artificial legs. A third function of braces is to prevent deformity. Drop foot, back knee, and knee flexion as a result of paralyzed muscles are all potential deformities. If a patient with a back knee or a drop foot is allowed to go without a brace the deformities will become much worse. By wearing a long leg brace with the knee slightly bent and the foot held at a right angle, he is able to walk with the foot and knee in good position. One cannot emphasize too often that in all of orthopaedics, the best treatment is to prevent rather than correct deformity.

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Exercise and Menstruation

By Helen D. Denniston, M.D.

All physicians who are interested in woman's posture have noted the coincidence of poor posture and dysmenorrhea. As poor posture is usually accompanied by weak and relaxed abdominal muscles, it seems logical that these are correlated with the pelvic condition through faulty circulation and pressure from visceroptosis.

These conditions were repeatedly noted during the physical examinations of the women students at the University of Wisconsin and it was decided to discover if dysmenorrhea was accompanied by really weak abdominal muscles and if the women who had strong abdominal muscles had more normal menstruation.

A method for testing the strength of the abdominal muscles had to be established for all previous tests included ilio-psoas strength or body weight. With the help of the Department of Physics an inexpensive apparatus was arranged to measure quickly the strength of the abdominal muscles only.

In 1931 two groups of girls were selected from among the student body, one group having dysmenorrhea and the other having normal menstruation. The result of the testing of these showed that the abdominal strength of the normal group was from 7 to 122 pounds more than the others and in no case did an abnormal subject have a greater abdominal strength than a normal.

Having established this fact it was decided to discover if by increasing abdominal strength the dysmenorrhea would be lessened. So in 1932 another group of students with dysmenorrhea was selected and tested for abdominal strength. To about one-third of these, special exercises were given and after periods varying from 13 to 22 weeks the strength of the entire group was again measured and the menstrual condition ascertained.

The unexercised group gained an average of 1.23 pounds with no improvement in the mentrual condition while the experimental group gained an average of 23.7 pounds with 63.15% reporting improved or normal menstrual periods. The range of strength in the unexercised group was from five pounds less to eight pounds more than their original measurements whereas the experimental group gained from ten to fifty-two pounds, those with the improved menstrual periods gaining an average of 28.58 pounds.

The conclusion drawn is that by strengthening the abdominal muscles, menstruation may be favorably infleunced.

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Treatment of Valvular Heart Disease

By Josephine H. Frey, C.S.M.M.G.

This is a brief outline of the treatment of valvular heart disease as it is practiced in England. The writer acquired this knowledge while studying at the Swedish Institute and Clinique in connection with Saint Mary's Hospital, London. Treatment of heart cases by means of massage is popular there and has brought some very satisfactory results.

This outline is not intended as a guide for technicians who have had no previous training in massage for heart conditions, as there is danger to the patient if all the precautions are not observed. It has been written as an item of interest and not as a guide to treatment.

Pathology

Treatment of valvular heart disease may be divided into four main types—mitral incompetence, mitral stenosis, aortic incompetence and aortic stenosis. A brief description of the pathology and symptoms will aid the reader to recall previous study of these cases.

In mitral incompetence the valve does not entirely close. This allows the blood to regurgitate to the left auricle with the closing of the mitral valve. When the pulmonary veins try to push blood into the left auricle, the cavity is already partly filled. This causes back

pressure and a congestion of the pulmonary system. There is less space in the alveoli for interchange of gasses in the congested capillaries. This results in an excess amount of carbon dioxide in the body and the symptoms to appear are cyanosis, dyspnoea, coughing, oedema, and a weak, unsteady pulse. In more severe cases the systemic symptoms will follow due to the aorta not receiving a sufficient amount of blood to send through the body.

Compensation is gained by hypertrophy of the muscular wall of the right ventricle which gives the blood a stronger push through the pulmonary circulation. The left auricle and ventricle dilate to receive the extra quantity of blood. The muscular wall of the left ventricle hypertrophies and contracts harder thus being able to send the normal amount of blood into the aorta.

In mitral stenosis there is an obstruction in the mitral valve which prevents the blood from flowing into the left ventricle. There is back pressure on the pulmonary veins and due to the congestion, pulmonary symptoms arise. There is a smaller quantity of blood entering the aorta, hence the arterial pressure is lowered and general circulatory disturbances are present.

Compensation is gained by hypertrophy of the right ventricle which can now give a stronger force to the blood as it enters the left auricle. This auricle dilates to receive more blood and the left ventricle hypertrophies in order to exert more pressure on the subnormal supply which enters the ventricle at every beat.

In aortic incompetence when the left ventricle relaxes, the aortic valve has not shut properly and allows some of the blood from the aorta to flow backward into the ventricle. Thus, due to the lack of blood passing from the heart to the body, the systemic symptoms appear—pallor, headaches, faintness and pain about the heart. There are no pulmonary symptoms since the mitral valve is uninjured and prevents regurgitation into the left auricle.

Compensation is affected by a dilatation of the left ventricle to hold the increased amount of blood, and a hypertrophy of the muscular wall to push the blood on with greater force. In spite of the regurgitation into the left ventricle, the arterial pressure is maintained at normal.

In aortic stenosis there is a blocking of the valve between the left ventricle and the aorta. To push the blood past this obstruction uses up so much of the potential energy that little is left for arterial pressure in the body. Here again systemic symptoms appear. The pulmonary circulation is unaffected for the mitral valve prevents regurgitation.

Compensation is brought about by the hypertrophy of the muscle of the left ventricle. The increased strength of the contracting ventricle is enough to push the blood through the valve and with a sufficient force to keep up the arterial blood pressure.

Aims of Treatment

The aims of treatment are:

1. To relieve the strain upon the heart as much as possible. This is accomplished by keeping the body in a resting position—one in which the heart uses least effort to maintain normal respiration and circulation; and by a slow, deep effleurage and kneading to aid the venous flow.

2. To increase the oxygen supply to the body. Breathing exercises and vibrations are used which assist in the quick interchange of gasses.

3. To assist in the hypertrophy of the heart muscle. As the hypertrophy increases the heart will be better able to carry on its work. Exercises carefully chosen to give a very slow progression will strengthen the heart muscle. Each time the progression is so minute that the heart is able to bear the added strain. The exercises are graduated until they become the activities of normal life.

Treatment

The patient is in bed, propped up by pillows, the heart being capable of compensation in this position. The room should be comfortably warm and the patient well covered to avoid any possibility of chill. The physical therapist should assume a quiet, gentle and reassuring manner in order not to excite the patient.

The chief guide in treatment of heart cases is the pulse and the respiration. It is most important to the physical therapist that she should keep an account of this, as it will give her exact data on which to proceed with the treatment. The pulse and respiration should be recorded at the beginning and at the end of the treatment when the pulse should not be more than six points highr. After two minutes' rest, the pulse should again be taken and by now should be the same rate as at the beginning of the treatment. If the pulse is a bit lower, the indications are that the heart is compensating better and the treatment has been beneficial to the patient. On the other hand, if the pulse has remained high, it is a warning to the physical therapist that the treatment has been too strenuous and must be diminished and again gradually increased to its former strength. At the first signs of restlessness, the treatment should be ended as quickly and as quietly as possible. To continue the treatment would only fatigue the patient more, whereas to finish abruptly might alarm her. It must be remembered that people suffering from heart disease are always in a state of fear and nothing should be done which might excite their suspicions.

At the first treatment, the pulse and respiration are recorded. If there is no pulmonary congestion, very gentle breathing exercises may be given to the patient's own breathing rhythm. This is optional, and for the time being, some people prefer to omit breathing exercises.

On the first day, massage is started at the feet—the point farthest away from the heart and therefore less likely to cause a severe reaction. A very soothing and gentle but fairly deep effleurage is given from the foot to the thigh to assist the general circulation and absorb any oedema which might be present in the lower extremities. About five minutes is allowed for each leg.

The pulse and respiration are recorded and two minutes later again taken and compared with the record at the beginning of the treatment.

On the second day, after having massaged the leg by effleurage, five minutes of gentle slow rhythmical kneading is added. Again the pulse is taken and if the report is favorable, the next day the physical therapist follows the massage by passive rolling of the ankles—four to six times in each direction.

This treatment is continued for a few days, gradually, very gradually deepening the massage and increasing the passive ankle rolling by one each day until the patient is ready for more strenuous work. During this time of course, the treatment has only been increased as the pulse has improved. It must not be forgotten that the pulse is the indicator for easier or stronger treatments.

The next stage is treatment for the arms. Naturally great care must be used since, due to the proximity of the arms to the heart, a sudden stimulation of the

circulation in this area may cause an overflow of blood into the right auricle.

The legs are treated as usual, then the arms receive a slow, rhythmical effleurage from the hands to the arm pits. The physical therapist should remember not to start the effleurage too deeply as a hastening of the blood in the superficial veins is sufficient for the heart to receive at the beginning. Following the same technique as was given for the legs, the kneading and passive rolling of the wrists are added and strength gradually applied until it is of the same quality as that given for the legs.

Passive movements for the knees, elbows, hips and shoulders are carefully added to the treatment—first the knee, then the elbow, then the hip and lastly the shoulder.

By this time the pulse should be slower and stronger. If breathing exercises have been omitted previously, it is advisable for the physical therapist to give gentle breathing with stroking and vibrations. To explain this exercise, the writer quotes from Dr. J. Arvedson of Sweden: "The gymnast stands in front of the patient and puts her hands behind the patient's back at the height of the shoulder blades. While the patient breathes in, the gymnast lifts the chest upward and forward, not high enough to life the head from the support, and strokes with the hands down the back and forward over the sides of the chest, finishing with slight shaking over the lowest ribs in front, while the patient breathes out." No pressure should be applied over the heart. Breathing exercises must be given with even greater caution to those suffering from mitral disturbances.

Back massage may now be introduced with the patient lying on her right side. The massage is gradually deepened until of quite a vigorous quality.

The patient is now ready to undertake active exercises. The pulse must be kept within the limits of fourteen to sixteen points higher than at the beginning of treatment and return to the patient's normal rate following two minutes rest at the close of the exercises.

Active flexion and extension of the ankle is allowed four to six times, and each day increased by one. Next, active flexion and extension of the wrist, knee, and elbow are gradually added and the number of times each movement is performed is increased. Hip and shoulder movements usually do not exceed four to six times as it may cause a rush of blood to the superior and inferior venae cavae. To avoid any impediment of respiration, arm movements are not given above shoulder level in the beginning.

The next step in advancement is to double the movements—that is to give two ankle flexions and extensions —four to six times. Gradually the number of times for the exercise is increased and then progression is made to the wrists, knees and elbows in the same manner.

When the patient is capable of performing these movements, the physical therapist should gradually increase the number of times per minute each exercise is practiced.

Later, to increase the activity, the exercises may be changed to gentle resistive movements—gradually increasing the resistance to strengthen the working power of the heart muscle still further.

When the patient is allowed to sit up, very easy trunk movements may be allowed—such as an easy trunk rotation. Trunk side flexion may be given to the right, but bending to the left side must be given with great care as it may cause pressure on the heart.

In regaining walking power of the legs, the patient should only be allowed to stand for a few moments the first day, to take one step the second day, two the next day and so on until she is able to walk about the house without fatigue.

By this time massage may easily be omitted and the patient given a set of exercises which will specifically strengthen each part of the body.

To get the patient accustomed to stairs again, a small platform about twelve inches in height is used. The first day, the patient steps upon the platform, then descends backwards to the floor. Each day she steps up one more time than the day previous. Then she attempts the stairs, ascending two and returning, gradually increasing the heighth until she is capable of climbing the whole flight.

The patient should now be able to lead a quiet and normal life without the aid of treatment.

This treatment in most cases would not be a matter of a few weeks, but would extend over a period of months. The length of time for treatment depends entirely upon the patient's reaction to progression.

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The Problems of Psychiatry

By M. M. Barship, M.D.*

Psychiatry, you are told, like psychology, concerns itself with mind—psychology with normal and psychiatry with abnormal or disordered mind.

But, you ask, what is a disorder of the mind? The question is prompted by a series of observations of your own. You recall seeing, in your professional capacity, one who complained of fatigability, irritability and gloominess, and the information you received was that he had a mental disorder. You thought, "I become fatigued, irritable and gloomy. Does that mean I have a mental disorder?"

You recall another case:—the man who had attacks of restlessness, tremulousness, flushing, etc. He was under a doctor's care. Is he, another of those problems? Any number of times you observed your girl friend restless and uneasy, especially when HE was late in arriving. Has she a mental disorder?

Then, there was the young lady at the clinic, the one who was said to have a perfect pair of legs, yet shuffled along, aided by two canes. They said she had a mental disorder. And you wondered how she differed from that office girl whose excuse for staying away from work the other day was that of sickness when it was generally known she had been quite well.

You had heard that a depression constitutes a mental disorder and you thought, "I hope he doesn't find me out—I get depressed."

You saw a patient recently who was overactive, quite

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cheerful and talkative, and you were made to understand that she was suffering from a psychosis—a Manic, they called her. And you thought of Susan Brown, who at a party recently "carried on higher" than this patient ever did, but no one regarded Sue as a behavior problem.

You have learned that apathy is often seen in schizophrenia. Yet you know many people who are apathetic to one thing or another, but are looked upon as being normal. You think of many more examples, but enough! The point of your question has been grasped.

In answering, let us retrace our steps. The first, gloomy, irritable, fatigued as a result of some particular circumstance, is back pursuing his accustomed duties within a reasonable length of time. The other, irritable, depressed, fatigued, introspective, self-analytical, preoccupied with minor somatic sensations, deatched from social and economic activities,—is leading the life of an invalid. The first is a variation in a normal individual; the second is chronically maladjusted—the neurasthenic type of reaction, if you please. This is a mental disorder.

It is one thing to be anxious and uneasy over the boy friend's delayed arrival, but quite another to have come upon one whom anxiety attacks, without rhyme or reason, with restlessness, tremulousness, palpitation, sweating, increased pulse and respiratory rate, and as is frequently the case, with associated fears—the reaction type of the anxiety and compulsion neuroses. These constitute mental disorders.

If the office girl remained away because she had a "big Date," her reaction, provided you are willing to forgive her for the little white lie, is quite a normal one. As to her with normal legs—so decreed by neurologist and orthopedist—shuffling along day in and day out—she, one gathers from the facts, has an hysterical paralysis. That is a mental disorder.

The human emotions are permitted wide variations before considered abnormal—and motivative circumstances have to be taken into account; so if Susan, at the party, did "carry on high," she had in her favor the appropriateness of the occasion and, it may be presumed, with the end of the festivity, terminated the hilarity. But Martha, the Manic, be the occasion what it may, without conscious motivation, to the dismay of relatives and with an inaccurate notion of her own conduct, sings, dances, whistles, laughs, jokes, slides, glides, appears one minute bedecked and bespangled and the next unkempt and bedraggled. Obviously, this is not normal behavior.

There is apathy in all of us in some given direction. You may be cold and indifferent to baseball; I am to football; some I know are indifferent to music, art, politics, economics. But we have normal interests, too. The schizophrenic is apathetic to all human relationships and values, some even to their delusion and hallucinations.

I have answered, not in the form of an academic definition, but by comparative reactions, the question, "What is mental disorder?" It need only be added here that in the milder forms of mental disturbance it is sometimes most difficult to determine where normality ends and abnormality begins.

You ask, "Why mental disorders?" One of the foremost questions of psychiatry is the finding of the answer to this question. Once, in the dark ages, it was an easy question; now it is a difficult one; then they knew the cause; now we do not know; in those days they did not theorize; now we have many theories. Their answer was: The dearranged man is possessed of the devil. Our answer, as psychiatrists, is, if we do not come to an understanding the devil will possess us.

In the forgoing paragraphs reference was made to the psychoneuroses (neurasthenia, anxiety neurosis, compulsion neurosis and hysteria) and to the psychoses (Manic—Depressive, Schrizophrenia and here let me add Paranoia and the Paranoiac States). These are the so-called "functional" or psychogenic types of mental disorder. There are others—the organic and toxic forms—for which the causes are known. It is in explanation of the psychogenic forms for which theories abound. Each theory has its faithful devotees. Each group of devoted followers is sure its formula is right.

Now for just a few of the theories:

Briefly, the psychoanalytical theory assumes that the neuroses (and psychoses) are due to psychosexual maladjustment and that the abnormal behavior—the symptom-group you observe—is an expression of, and represents a regression to a lower or earlier psychosexual phase. They postulate three (why three?) phases. The first, up to two years, the auto-erotic; the second, at four years, the phase of pre-genital organization; and the third, at six, the completion of the genital organization. In the event of trauma during these development periods, there may be a fixation of the libido (psychosexual impulse) at any of the phases. Given a case of psychosexual maladjustment, then, a behavior disorder ensues, the symptoms being expressive of the phase of libidinal fixation.

Another theory is the organic, based on the assumption that every departure from normal is the result of a biochemical or physical alteration of the nervous system.

The Social-Biologic theory explains the psychological disorders on the basis of the conflict between the individual and his environment. It holds that the subordination of the instinctive cravings to social requirements; the changes in the economic order; the struggle to earn a livelihood; the constant demand for readjustment to the various complexities of life, including painful submission to pigmy-minded dictators whose rise to power is accomplished by falsehood and deceit; "the demands for adjustment to love-life under ethical and moral standards which interfere with instinctive desire" —all lead to conflict. He who cannot solve the conflict in a manner satisfactory to himself and society develops a behavior disorder.

There are more theories. Some truth there is in each of them; all truth there is in none of them. In general, while the last one furnishes some light, the first goes a little further in generating heat.

Returning to the first again—while it cannot be denied that the sexual demand plays an important part in the psychic life of the individual, it is begging the question to argue that all behavior disorders are the result of psychosexual difficulties. Some undoubtedly are. It is a matter of common knowledge that in times of great upheavals—wars, economic depressions, violent changes in the social structure, natural catastrophies—crops of neuroses and psychoses appear not only among individuals but among nations. One need but look into great sections of a disorganized world at this writing to see hysteria, anxiety, melancholia, schizophrenia, paranoia made or in the making.

Not because of psychosexual problems do those caught in the maelstrom of war, panic, hunger, poverty, unemployment, expulsion, illegal incarceration develop mental disorders. My knowledge of many of these people has convinced me that during the period of such mental and physical suffering the sex impulse is not the dominating one. At such time the self-preservative instinct stands supreme.

Nor should it be thought that because one is more fortunately situated, a developing morbid state of mind need of necessity be of psychosexual origin, though it is more likely to be a causative factor here, for experience teaches that when the body is clothed and the stomach filled, the conscious or unconscious trends of man turn to woman. In general the fears and uncertainties and insecurities of life are as much a part of the rich man's psychology as that of his less fortunate brother. It was only yesterday that the mighty, through a trick of fate rendered financially insecure, in despondency plunged to their death from the heights of the towers their gold had built—or took refuge in lands unknown.

The organic theory undoubtedly explains many of the disorders, and the plea that "with improved instruments of precision microscopic changes will come to light" must be given serious thought, yet one fails to see how the organic theory explains the case of the man who, upon receiving a minor injury to his leg during working hours promptly lost the use of the extremity and upon being compensated promptly regained its use; or, for that matter, regained it at a revivalist meeting some time later.

I lean to the concept that recognizes a basic conflict between man and his environment and between his instinctive cravings as opposed to his ethical and moral standards. Man's instincts are forever seeking realization and gratification, but he must push them aside—repress them—to conform to social demands, on the one hand, and to maintain his self-respect, on the other. The social organism, in order to survive, must insist upon obedience to law for the preservation of the state. The individual must subordinate desires for the group welfare. A balance must be struck up. The state may not be tyrannical, oppressive, arbitrary, dictatorial. It may not be oblivious or indifferent to the citizens' needs. It may not be discriminating. For in such events, the condition of the mind is not in health. Those holding the upper hand become arrogant, deceitful, intolerant, domineering, blusteringly egotistic, suspicious,—in themselves symptoms of mental disorder, while those on the other end of the scale, in their hopelessness and helplessness, develop morbid trends of an opposite character.

The individual must refine his instinctive urges to make them socially acceptable. The state—and all that this implies—must not make this task too difficult of achievement.

It is not always the result of inherent deficiency that men break. I have known men who could pass the test in any man's world break under the stress and strain of certain environmental conditions.

The break in a man's capacity for adaptation implies an unhealthy condition somewhere, as much in the social structure as in the inherent constitutional makeup of the individual. The ancient habit among psychiatrists to call the failure, the neurotic, the psychotic an essential psychopath has not added materially to the fountain of human knowledge. It does not follow that he who gave up the struggle was of necessity a weakling.

The psychogenic neuroses and psychoses are not diseases in the sense as is tuberculosis or cancer. They are types of reaction. They represent flights from intolerant and unacceptable situations and problems which the individual is unable to overcome. In the neurosis the individual takes refuge in a psychologically created illness and in the psychosis he escapes from the realities by the creation of a world of phantasy. In the neurosis the individual only partially solves his conflict so he is constantly iterating and reiterating his somato-psychic complaints in defense, as it were, of his position—for his failure to adjust to the problems of life. In the psychosis, generally speaking, he has solved his situation so that in the world of his own creation, through phantasy he is able to realize in unreality the desires, cravings, hopes and ambitions unfulfilled in the world of reality.

Permit me now to cite a few illustrative cases:

Mr. B., 36, plumber, married, father of 4 children, was well adjusted until 3 years ago when he lost his job. Optimistic at first, he gradually became discouraged at his failure to find another, and finally became a recipient of the local charities. *Presenting complaints:* For the past 2 years; weakness, irritability, depression, gaseous indigestion, cardiac palpitation. *Diagnosis:* Neurasthenia. This symptom—complex, manifested at the physical level, had its origin in the psyche and is directly attributable to his distressing economic situation. Having to fall upon charity had its additional demoralizing effect. The patient of course, did not know his illness had no actual physical basis.

Mr. A., 40, accountant, employed, married, one child. *History of attacks* of cardiac palpitation, great unrest, shaking all over, sensation as if blood is rushing to his head and panicky fear, attacks occuring almost weekly, lasting for a half to an hour. *Personal history* negative except that a few years ago he lost all his savings in a bank failure and now had reason to feel his job might not hold out. Examinations entirely negative. *Diagnosis:* Anxiety neurosis. These attacks of anxiety represented an unconscious fear of destitution—a threat against his security, his self preservation—what with his savings lost and his job in the balance.

Mr. J., Got into an altercation with Mr. S., whereupon the latter challenged the former to a duel. At the appointed time and place, both gentlemen, with their seconds, made their appearance. It was noted, however, that Mr. J's arm was paralyzed. Examination showed it to be a flaccid, obviously hysterical paralysis. Upon further investigation it was learned that while Mr. S. was known for his skill, Mr. J. was notoriously unskilled. The psychological interpretation in this case is too clear to need elucidation. The instinct of self-preservation is most conspicuous here.

Mrs. S. M., about 44, married, wife of a minister, childless. For the past 5 years she had been accusing her husband of infidelity. Voices in the air told her he wanted to get rid of her so that he could be free to live with another. Committed to a state hospital where physical examination was entirely negative and mentally her behavior was of the schizophrenic form. During her hospitalization this interesting observation was made:—Detached from her surroundings, in a state of extreme self-absorption, carrying a little package under her arm, she was seen walking up and down the ward, occasionally, though blankly, looking here and there. Questioned, she stated she was carrying her night gown under her arm. Asked why, she replied, "they are going to operate on me." Following it up it was learned she had been having auditory hallucinations, she heard she was to go upstairs, where the surgeon (obstetrician) was waiting to operate upon her (deliver her). She was to have a baby. A talk with her husband revealed that for many years prior to the present mental illness she deplored her childless state. There is much to be said about this case, but the point I desire to make here is how this lady realized, or was about

to realize, in unreality what she could not have in reality.

Other cases could be cited to illustrate the diverse ramifications of life in all its aspects involved in mental disorders.

Summary. In this presentation attention was called to the scope of psychiatry; the classification of the types with which this paper is primarily concerned, with a brief description of the commoner forms; attention was called to the similarity of behavior in the normal and abnormal, with points of differentiation. By inference, it was established that the behavior of the most profound psychotic is no more haphazard than is that of the accepted normal but for the fact that while normal behavior is usually conscienciously motivated, abnormal and to a considerable degree normal—behavior is unconsciously directed. Attention was called to some of the theories including the mechanisms involved, with a word of criticism here and there. Finally the question WHY, in some instances, individuals previously well adjusted and without sufficient pressure from the outer world take flight from reality, has not been answered. It has never been answered to my satisfaction, nor can I answer it to yours. But if in this we are in the dark, so are we in the matter of how this whole world got started, whence we came, why we are here, whither we are going, which is another way of saying we are not half as wise as we think we are.

Officers and Executive Committee of the American Physiotherapy Association, 1932-1933

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EDITORIAL

To the Old Review Staff

Away back in March 1921 there appeared a small blue magazine—no, not on the magazine stands of the news dealers—but in the mail boxes of a very few people. At the top of this magazine stood in bold black type, P. T. REVIEW, and at the bottom, American Women's Physical Therapeutic Association. Inside the covers were several announcements, several greetings from prominent persons, a copy of the by-laws, and a list of members! The copy of this Volume 1, Number 1, now in the editorial files, is somewhat faded and worn. The inside pages are already turning yellow. It takes its place in the always honored niche of the genesis of worth while things.

For out of that beginning developed the familiar grey journal which comes to you bi-monthly from the American Physiotherapy Association—a journal which has developed into the worth while thing heralded by the blue beginning. In it appear professional articles from some of the most prominent medical men in the country, and from Association members who have helpful material to offer. It is an education in physical therapy and an inspiration to physical therapists.

In large measure is the success of the REVIEW due to the retiring staff—to Dorothea Beck, editor since 1927, and to Gertrude Beard, business manager since 1928. A goodly share of praise is their due for the job they have executed and the magazine they have built up. With the vision of those who desire to make a thing grow, they took the little magazine their own predecessors had so boldly started, and out of that valiant beginning they built a journal of which our organization may well be proud.

Everyone who has ever had a "job" in the Association knows what a responsibility that is, and knows how many hours and days and months one may devote to such an "extra." Even those who have had no such responsibilities, may imagine the time and energy our editor and business manager must have given to the work of the REVIEW in the past years.

Not only do we praise them for the end results—we admire them for their ability and generosity, and we are grateful!

And now comes the new REVIEW staff, following in the steps of those who have done so well. The members of this staff pay respect to their predecessors, and are ambitious to continue the way pointed out. Not only do they desire to follow the splendid trail blazed for them—they wish to try out new by-ways, and branch forth into new ventures, even as the predecessors themselves did experiment, and succeed. The present staff begs the support of the members of the American Physiotherapy Association in maintaining a GROWING magazine.

American P-H-Y-S-I-O-T-H-E-R-A-P-Y Association.

How do you pronounce that?

What does it mean?

Such were the questions asked of our representatives at the annual session of American Medical Association and at the annual session of American Hospital Association. We were new exhibitors and realized very early the importance of giving accurate information concerning the American Physiotherapy Association. A discourse would follow about the definition of physiotherapy, our educational requirements and the policy of our

members working under the supervision of registered physicians.

One newspaper reporter listened to all the information given and then wanted to know—what we actually did. He wanted to know the when, the why, and the what happened. The important question with the lay people seemed to be—In what cases is physical therapy of service?

A Masseur examined our booth with much thought and wanted to know about our state examination for practice.

An instructor of massage in a training school for nurses wanted to know where she could get some of the "high lights of massage" to pass on to her students.

Physicians and hospital attaches told of people who "worked into this line" without any particular background or training in a school of accredited physical therapy.

So few realized that such an organization was in existence, and that not everyone who gave massage or gymnastic exercise was eligible for membership.

These questions made those of us who were present, very conscious of the importance and need of "selling" the American Physiotherapy Association to our own locality. As our Association is still in its childhood and possibly suffering from "growing pains", it is of value to our own reputations as well as to those who follow us, to preach and act to extend the gospel for which we stand. We are still small in numbers but with courage and fortitude, physicians, hospitals and lay people will know us better. Each local group must take the responsibility of being better known in its community. Newspapers and professional publications should have information of our existence, ethical standards, and performances. Personal contacts with those who should be interested in qualified physical therapists will increase our notoriety.

If each member of the American Physiotherapy Association will take this responsibility seriously, in the future no one will ask—"How do you pronounce P-H-Y-S-I-O-T-H-E-R-A-P-Y?"

L. E. B., *Wisconsin Chapter.*

The American Physiotherapy Association*

By Josephine L. Rathbone

The American Physiotherapy Association had its inception in the minds of some of the women who were called Reconstruction Aides during the World War. Any description of the present organization of the association would be incomplete without an explanation of the part those Aides played during the period of our participation in the war. Too much cannot be said in appreciation of the spirit of the Reconstruction Aides while they were in service, and of their unfailing courage and enthusiasm in making of their work an established profession highly respected as an adjunct to medicine. The principles of professional and personal conduct for which they stood have become the accepted principles of the American Physiotherapy Association.

The work done by the Reconstruction Aides was that of physical and occupational therapy, the Aides being trained in one or the other profession. The purpose of their work was two-fold: to rehabilitate the men by restoring physical function, and to empty beds for other oncoming patients. Occupational therapy is curative as well as physical therapy; it is not prevocational or vocational training. The American Physiotherapy Association developed from the group of physical therapy Aides. The occupational therapy Aides have organized their own association. If it were not for the fact that a specialized training is necessary for each type of therapy, the "P.T.'s" and "O.T.'s" might still be in the same organization, for they are cordial to each other's ideas, and appreciate that each can help the other in their common object—to restore physical function by the use of proper tools.

At the time the United States entered the war, there were in the service no women trained to help with this work. No nurses could be spared to receive special training, so it was necessary to tap another source. Colonel Joel E. Goldthwait was the Chief Surgeon in the Orthopedic Medical Corps of the A.E.F. in Foreign Service. Colonel E. G. Bracket held the same title, and was in charge of the Domestic Service. He was stationed in the Surgeon General's office in Washington. Through the energies of these two men, several qualified women were called into service; among them, Marguerite Sanderson from Dr. Goldthwait's office in Boston, and Mary McMillan, an English physiotherapist who happened to be visiting in this country. To these two women a great deal of responsibility fell.

On December 31, 1917, the organization known as the Reconstruction Aides originated in the office of the Surgeon General in Washington, where Miss Sanderson was stationed, one woman among nineteen men. The organization was formed as a subdivision of the Medical Department of the Army under the direction of the Division of Orthopedic Surgery. It was first called the Women's Auxiliary Medical Aides, then simply Medical Aides; but the name finally was changed to Reconstruction Aides when this organization was transferred, on April 1, 1918, to the Division of Physical Reconstruction.

Another person whom Dr. Bracket called to the office of the Surgeon General was Dr. Frank B. Granger of Boston, who was developing a strong department of physical therapy in the City Hospital there. By July, 1918, when Miss Sanderson was transferred to Walter Reed Hospital, Dr. Granger was placed in charge of all matters relating to Reconstruction Aides in physiotherapy. He was the untiring friend of the Aides. Some of them still speak of him as their professional father. All those who were privileged to meet Dr. Granger were impressed by his kindliness, and were encouraged by his enthusiasm for the growing profession. Into that profession he was anxious to draw women of thorough educational background as well as specialized training. He helped as much as any one person to set the standards of the present American Physiotherapy Association by encouraging the right type of women to enter the service, and by assisting to establish high qualifications, both physical and technical.

*Reprinted from Health and Physical Education, September, 1933.

The Reconstruction Aides in Physical Therapy were drawn chiefly from the graduates of training schools of physical education, after they had been given special courses in massage and theoretical and practical physiotherapy, embracing hydrotherapy, electrotherapy, and mechanotherapy. During the war, and for a few years following, "physiotherapy" was the term in vogue to define these branches of therapy. Now they are classed under "physical therapy." A Reconstruction Aide had to be qualified in at least two of the above branches, massage and hydrotherapy being considered the most important.

Government circulars stated that: "They must present a certificate that they had pursued a course not less than four months in physiotherapy, said certificate stating date of beginning and completion of the course and specifying the subjects taught, together with the total number of hours allotted to each subject, and the total number of hours of active clinical work actually performed by the graduate; which must not be less than two hundred and forty.

"They must be between twenty-three and forty years of age; and citizens of the United States or subjects of one of the countries allied with the United States in the war against Germany. They must furnish at least two references as to character and such further certificates as to professional ability as they are able, from physicians or hospitals who have employed them."

The Reconstruction Aides were civilian employees of the War Department. They took the oath when they entered the service, and they were not free to leave the service until the War Department saw fit to give them their discharges.

Technically and practically, the Head Aide was under the direction of the Chief Nurse in the hospital to which she was assigned. Another name that should be given place in this history is that of Julia Stimson—"Major" Stimson—Chief of the Army Nurse Corps. But for her cooperation and spirit of fair play the Aides could never have made progress.

The first course for the training of Aides was organized at Walter Reed Hospital in Washington. This one school could not supply the demand, so pleas were sent out to colleges and schools of physical education to prepare Aides. Fourteen schools and colleges organized courses to meet uniform requirements outlined by the Surgeon General's office. The first course to meet the above requirements was at Teachers College, Columbia University, New York City. It was under the supervision of Miss Lillian C. Drew, whom we all hold in high esteem. Miss Drew chose her students with wisdom and one can not reckon the extent of appreciation that was felt by all who came in contact with her graduates.

The largest training center was at Reed College, Eugene, Oregon, under the supervision of Mary McMillan. It trained two hundred women. Everyone who has ever worked under Miss McMillan feels a debt of gratitude for her teaching and the inspiration of her personality. She is now in Peiping, China, developing a department of physical therapy in the Rockefeller Hospital.

Before the completion of the war the schools and colleges had trained almost two thousand women. They were sent overseas as rapidly as possible, until almost three hundred were there. Miss Sanderson, herself, went over in September, 1918, leaving the training of her Aides to the splendid women in charge of the courses. To this day, Miss Sanderson holds those women in great affection. Some of them will possibly read this short paper, for they are prominent in the American Physical Education Association. Miss Sanderson, now Mrs. H. T. Smith, living at Great Neck, Long Island, sends them her greetings.

One hears only praise of the work of the Reconstruction Aides at home and abroad. Many ex-service men will remember the cheerful women in their bright blue uniforms, who ministered to their needs, both physical and psychological. The types of cases they treated were surgical, orthopedic, and mental, chiefly, also medical and blind. One of Miss Sanderson's reports gives the total number of Aides overseas as 275. She estimated that they treated about 247,500 patients per month, and states that the number of treatments given during the year from May, 1918, to May, 1919, was 2,970,000. No wonder the Reconstruction Aides are remembered.

A letter from General John J. Pershing to Colonel Joel E. Goldthwait, dated February 20, 1919, expresses his own appreciation for the services of the War Aides in reclaiming "many men for the useful and industrial pursuits of life who would otherwise probably have been hopeless derelicts upon society." Dr. Goldthwait sent the letter to Miss Sanderson, "In grateful acknowledgment of the very important part, which she, as Supervisor of Reconstruction Aides for the A.E.F., performed in making this work possible."

Newton D. Baker, Secretary of War, wrote personally to Miss Sanderson, some years after the war, commending the Aides for their conspicuous assistance to the orthopedic surgeons in helping them to relieve the pain of the "men," to reduce the number of hospital days, and to lessen the amount of their permanent disability. Miss Sanderson, in turn, has tried in every possible way to send these acknowledgments on to her many loyal assistants.

After the war, the Aides who had been mustered out of service decided to organize in small groups for their mutual benefit. Now that the war was over, several nurses sought training in physical therapy, and joined the groups of ex-Aides. Early in 1920, a committee at Walter Reed Hospital organized the American Women's Physical Therapeutic Association, with Miss Mary McMillan as president, and Miss Janet B. Merrill of Children's Hospital, Boston, as secretary. On January 15, 1921, a meeting was held at Keen's Chop House in New York City to discuss the question of forming a national physiotherapy association, with all the local branches under one constitution and with national officers. At this meeting, Lieutenant-Colonel Frank B. Granger, Major William McFee of Boston, Lieutenant-Colonel H. D. Corbusier of Plainfield, New Jersey, Major Ney of New York, Major Sampson of Fox Hills, and Commander Bainbridge of the Brooklyn Naval Hospital, as well as thirty Aides, were present. The organization took the name of the American Women's Physical Therapeutic Association, which name it kept until March, 1922, when it was decided that men holding the same qualifications should be eligible. Then the name was changed to the American Physiotherapy Association.

There has been great difficulty in keeping that name. For five years, until the association was incorporated in 1930 in the state of Illinois under that name, there was constant discussion of changing it. The objection to the name—American Physiotherapy Association—for the women's organization was advanced mainly by a group of doctors who were specializing in physical therapy and wanted the women to call themselves Physical Therapy Technicians instead of Physiotherapists. The women had no other wish than to work under the supervision of the medical profession, but some of the mature, cultured, and highly trained women who started the Amer-

ican Physiotherapy Association were unwilling to be classed only as technicians.

There is still some disagreement among the medical men as to what the qualifications should be for one of their non-medical assistants. Some of the men want partially trained helpers, although, fortunately, most of them feel that they need well-trained women and men. Those who want assistants who have had training only in certain branches of physical therapy can find them in any high school and can give them a few instructions themselves, or can send them to take a short course in massage, or diathermy, or colonic irrigation, or what they choose, but they can not find them in the ranks of the American Physiotherapy Association.

The educational qualifications for active membership in the association are: One year's practice in physical therapy within two years of graduation from:

1. An approved school of physical therapy, by which is meant a school which gives not less than three years training in physical therapy, and which is on the approved list of the American Physiotherapy Association.
2. An approved course in physical therapy of not less than nine months, which is on the approved list of the American Physiotherapy Association, following graduation from a school of nursing or physical education which meets the requirements of the individual state.

Occasionally the executive board approves for membership a person with a slightly different, but an equivalent training. As time goes on other changes may be made in the educational requirements, but the trend does not seem to be toward making the path easier.

There are now two schools of physical therapy on the approved list of the association, as well as eleven graduate and five undergraduate courses. Of the graduate courses, five are given in medical schools, four in hospitals, one in university extension, and one in a school of physical education. Of the undergraduate courses, two are given in university departments of physical education in cooperation with their medical schools, two in schools of physical education in affiliation with hospitals for practice work, and one in a university with a year out of residence in a hospital. There are short courses which are not sufficient for membership in the association, but which enable a qualified physical therapist to study further.

Some schools and courses have been discontinued temporarily, because, just at present, the supply is as great as the demand, in this as in most professions. Unfortunately many hospitals and school systems have had to close their departments of physical therapy, and many doctors have been forced to reduce their number of helpers. The schools which have discontinued their courses state that they do not wish to increase the number of unemployed. Since, on the other hand, people may wish to gain added experience when they are out of employment, a few new courses have been organized this year. They are making a brave start.

The statement above, that some doctors do not feel that they need well-trained "physiotherapists" as their assistants, should not mislead the reader into thinking that such is the trend. The American Physiotherapy Association has had as its advisors and counsellors some of the outstanding men in the country. Its present advisory committee is made up of Dr. John S. Coulter, Dr. Ludvig Hektoen, and Dr. Dallas Phemister of Chicago, Dr. Frederick Gaenslen of Milwaukee, and Dr. Wallace H. Cole of St. Paul.

The Council on Physical Therapy of the American Medical Association, having as its primary object the protecting of "the medical profession and the public against fraud, undesirable secrecy, and objectionable advertising in connection with apparatus and methods of physical therapy," has been most cordial to the American Physiotherapy Association. Never has the association turned to that body for advice without receiving encouragement and help. The American Physiotherapy Association is anxious to keep that cordial relationship. It is also anxious to keep the good will of the doctors who have specialized in physical therapy. The best friends of the individual members of the American Physiotherapy Association are the doctors for whom they work.

The American Physiotherapy Association has an organ of which it can be proud—*The Physiotherapy Review*—published bi-monthly. Since June, 1927, the Editor-in-Chief has been Miss Dorothea M. Beck, of Montclair, New Jersey. The Business Manager is Miss Gertrude Beard of Chicago. To these women is due the credit for the recent growth of the magazine.

Most of the papers and articles are the contributions of members of the medical profession and their associates, which papers may have been presented previously before state or local groups of the association, or at the national conventions. Not the least interesting feature of the *Review* is the set of abstracts of articles and book reviews contributed in each issue by Dr. John S. Coulter of Chicago.

Usually, the annual conventions of the American Physiotherapy Association have been held at the same time and place as the spring convention of the American Medical Association. This year the national convention was held during June in Chicago. Two sectional meetings were called on the East and the West Coast during the spring. Any member of the medical profession or any friend of the association is invited to attend these meetings. The aims of these meetings are the same as the aims of the association: (1) to serve as a medium for the in-service education of its members, and (2) to help to raise the standards of physical therapy in this country. The association wants the help and criticism of non-members.

Department of Physical Education, Teachers College, Columbia University.

Physical Therapy in Athletic Injuries*

By Mildred Elson

Physical Therapy plays an important part in the treatment of athletic injuries. Its proper use aids in the early recovery with the greatest possible functional restoration in bone, muscle and ligament injuries.

The most important Physical Therapy measures are heat, massage and muscle training exercises. These

*Talk given before the Therapeutic Section of the American Physical Education Association in Louisville, Ky., in April, 1933. The talk was accompanied by a movie demonstrating actual Physical Therapy care.

should be administered by a well-trained technician at the instance and under the direction of the attending surgeon.

Heat in one of its various forms is, as a rule, the first therapeutic treatment in any athletic injury. It relieves spasm and produces a relaxation of the tissues particularly the muscle fibres. The walls of the arteries are relaxed. There is a greater amount of arterial blood flow to the part bringing oxygen and nutriment. The resulting increased veinous flow carries away muscle waste.

First case is that of a fractured elbow sustained by playing football.

The patient sits with the arm in a comfortable relaxed position. The fingers and upper arm are supported by a soft roll. A moist towel over the arm prevents burning, and allows the patient to tolerate more heat. A zoa or infra red light is used in this case, and is applied for fifteen to thirty minutes.

Massage is given to the muscles above the injured part first. This starts the removal of the waste products and assures an unobstructed flow when the lower arm is heated.

Gentle rhythmical stroking further relaxes the muscle fibres. The stroke is toward the heart. The hand follows the muscle group lightly but firmly. Close contact with heel of the hand to prevent back flow is important.

This is followed by a kneading stroke. Blood containing waste products is gently squeezed out of the muscle. Stroking again completes the cycle.

The lower arm is treated in a similar manner.

Massage is indicated in most injuries to relieve pain, to improve circulation, hasten absorption allowing less chance for adhesions and thus hasten repair.

A good rule is always to approach injuries slowly and carefully. Irreparable damage can be done by vigorous massage and manipulation by an over-zealous technician.

Signs that massage has been too vigorous are swelling, tenderness, any redness or heat about the joint and increased muscle spasm.

In this case massage of the hand is not shown as patient did not need it. His finger motions and strength are normal. Finger exercises had been started while the arm was still in a sling.

The upper arm is again massaged to complete the treatment.

The arm is now ready for muscle training exercises.

Supination: The patient turns the operator's hand so that his own palm is up. The operator returns the hand to the first position.

Elbow flexion: The patient lies on his back to prevent motion at the shoulder. The boy pulls the forearm up and the operator returns it to extension. Forcible manipulation should not be given to fractures in or about the elbow. Motion should be limited to the free range. Decreased motion and a poor result are the penalties for breaking this rule.

Elbow extension is performed in a reverse manner.

Stiffness in the shoulder from immobilization in a sling is not unusual. This shows active shoulder abduction with gravity removed.

Knee Injury: A roll under the knee relieves any strain on the muscles. A moist towel is applied. Sand bags at the feet prevent rolling in and out. A radiant light baker is covered so that no heat will be wasted.

Hubbard Tub: Extensive injuries, particularly fractures, should be exercised first in warm water. Muscles have become weak from disuse and the joints are stiff. Gentle movement under water at a temperature of 95°-98° is an ideal beginning. The water warms cold muscles. It buoys the extremities so that gravity is counteracted. Passive, active or resistive movements can be given, as the case requires.

Full motion of the hips is possible. The tub is so shaped that a physical therapist may stand near the patient and accurately control the movements without straining her back. The tub also is sparing of water.

This would be a good exercise for a fractured hip.

A knee exercise is performed in the same position with the affected side upward.

Foot exercises may be done in the water. In this one the patient relaxes and the physical therapist points the toe. Then the patient tries to pull the foot up.

Sling Suspension: While the patient is still confined to the bed, sling suspension exercises are best combined with those in the tub. The extremity is placed in a padded sling which is hung from a frame on the ceiling. The sling can be arranged to exercise any joint that needs it.

For a shoulder injury in which the power to raise the arm has been lost, free active exercise in a sling can also be given.

This patient had a fracture of his upper arm with almost complete loss of power to raise his arm against gravity. Heat, massage and sling suspension exercises were given.

He now has, after three months of treatment, almost complete function though muscle power is not quite normal.

Hot paraffin wax baths we have found very efficacious in treating hand injuries. The temperature of the wax is about 118° to 130° F. The hand is dipped in and out from 15 to 20 minutes forming a "glove." It becomes thoroughly heated and moist. Swelling is reduced, and scar tissue softened. It is then taken off and the hand is ready for massage and exercise.

The shoulder is our most unstable and poorly protected joint. It acts as a buffer and protection to the body and is therefore a common site for many acute and chronic disabilities.

Fractures and dislocations, or both, may occur in any sport through a fall or blow.

Immediate diagnosis and treatment by a physician is necessary. (Amateur first aid will often increase muscle, ligament and nerve injury.)

In dislocations the arm is sometimes strapped to the side, and occasionally placed in an aeroplane splint. In either case the great danger is the formation of adhesions, and Physical Therapy should be started at once.

Heat is given twice a day, followed by light stroking massage to the arm and shoulder. All possible finger, wrist and elbow motions should be given. In a few days tightening of the shoulder muscle which raises the arm to the horizontal position is given to maintain its tone. In a week (or less) passive motion is started. The operator moves the arm from the side to above shoulder height. Motion is stopped if there is any muscle spasm. The arm is held at this point for a few seconds or until the patient is relaxed. The exercise can then be completed.

Active exercise is substituted as soon as the condition permits.

Normal range of motion should be present within four weeks in a dislocation without complications. Strength will not be normal, however.

Violent exercise is not indicated for six to eight weeks or until strength is adequate.

Fractures of the shoulder girdle and upper arm bone near the shoulder joint we cannot consider in detail. The length of the healing period and the Physical Therapy vary. Some surgeons start light, stroking massage in fractures on the second or third day. Massage and active exercises are given immediately to the hand, wrist and elbow. Other surgeons immobilize the arm in a plaster

cast for a period of time. Upon its removal, Physical Therapy is given to regain function.

A shoulder sprain occurs during a fall in which the arm is suddenly forced against the body, tearing the Supra Spinatus.

Treatment: Rest in an aeroplane splint, and Physical Therapy as in dislocations.

A bruise of the shoulder joint is frequently overlooked after a fall on the outstretched arm. The wrist is fractured and the force of the blow is also transmitted to the shoulder joint. The fracture receives immediate attention. In a few days pain and stiffness develop in the shoulder joint. Immediate Physical Therapy to the elbow and shoulder is indicated to prevent pain and loss of function.

You are all familiar with the glass arm which follows sudden overuse, as in the beginning of the baseball season. Deep heat and massage are given immediately, followed by graduated exercises.

Any injury to the shoulder, even a mild wrenching or a bruise, should be regarded as serious. If they go untreated adhesions and stiffness appear, causing severe disability and discomfort.

The knee joint is the largest in the body. Its strength is due, not to the shape of the joint, but to strong ligaments and muscles which unite them. The fractures at the knee occur rarely in sport. Physical Therapy aids in restoring function after surgical repair. The amount of treatment depends upon the severity and location of the fracture.

The internal lateral ligament is frequently sprained in basket ball, football and field hockey.

It is produced by a fall or blow which forces the knee into knock-knee. There is pain and tenderness on the innerside of the knee.

Treatment: Immobilization by strapping or splinting. During this period the tone of the knee extensor muscle is kept by teaching the patient to tighten it many times a day. Much valuable time in restoring muscle power will be saved by this simple procedure.

The usual routine Physical Therapy measures, to restore motion and strength, are given as soon as splints and straps are removed.

Foot inversion exercises must be started immediately. If the patient walks with the toe pointed outward it will cause further strain on the knee. Mechanical help is given by raising the inner border of the heel.

Rough sport is usually prohibited for the season. Other activity which does not strain the knee may be assumed in three to four weeks.

The internal semilunar cartilages are injured in a similar manner. In the conservative treatment of this injury after brief splinting, heat, massage and motion are important. If surgical removal of the cartilage is necessary these measures are again used to hasten recovery. Contraction of the quadriceps is very important.

Any knee injury may cause excess fluid under the knee cap and this is commonly called "water on the knee." If the fluid does not absorb, it should be removed before Physical Therapy is attempted. In the minor bruises and strains of the knee rest and heat are generally sufficient to restore function.

Physical Therapy will not perform miracles, but intelligently used as an adjunct to good medical care, it should shorten convalescence and restore function with minimum discomfort.

Psychic Trauma

By Richard W. Larer, M.D.

How often is the surgeon, internist, or the general practitioner called to see a patient and finds himself confronted with an individual whose predominant symytoms are mental? Again, how often has he failed to recognize the underlying mental or emotional state of his patient? These are every day occurrences met by the physician, be he specialist or in general practice, and are of vast importance in diagnosis and in instituting the proper method of treatment.

Any condition of ill health, whether the result of injury or a physical or mental illness which keeps a man from work, is a disability and may be temporary or permanent. Illnesses or injuries present two aspects, namely: the functional derangement or illness of the particular part of the body which is affected, plus the systematic symptoms naturally following, whether the condition arises from infection or metabolic changes; secondly, the nervous or mental shock to the patient. All types of illness or trauma have this so-called mental shock.

This picture is frequently overlooked and the average physician pays but little attention to the conscious mental side of his patient, his anxiety, his fear, his depression, his melancholy state, unless some positive brain symptoms arise as a part of the condition, or a complication of it; yet with the onset of the first symptoms of injury or disease, a series of nervous symptoms appeared. There was a positive psychic trauma. This we find particularly in traumatic surgery. In the care and treatment of all forms of illness or injury, physical or mental, the psychological aspect of the patient should be carefully considered.

Every physician should know just how a patient feels toward himself and his particular malady or injury. Since the practice of medicine and surgery has been divided into so many specialties, there is a tendency to lose sight of the patient himself and his psychological side, and to treat only a particular portion of his anatomical make-up, the part involved. The failure to recognize this psychic element has provided a means for the cults to thrive, their particular forte being to pay particular attention to the mental side of the patient.

The reason that the mental symptoms are often overlooked, or little or no attention is paid to them, is because the busy physician does not give his patient sufficient time to tell his own story. Objective symptoms are observed more carefully than the subjective. Sufficient time should be allowed to permit the patient to unburden himself, to present his own story in all its aspects. In this way an insight into his emotional side may be obtained.

Every physician should be familiar with psychology and psychotherapy. It will be frequently found that through these channels, he will hasten the recovery of his patient and often prevent harm by mis-directed therapy. Deep rooted complexes are often brought to the surface by allowing the patient sufficient time to tell his

troubles, especially if the physician is an understanding listener, and many conflicts that have proven a hindrance are removed. Frequently a patient's anxiety over a purely physical illness or condition develops into a neurosis; or again an impairment of function in an organic system of the body, may so upset the physiology of the whole organism that the nervous system may function improperly. Physical abnormalities are often of themselves of minor organic importance or significance, yet of primary significance in the development of psychic symptoms due to the actual shock of disease or trauma.

Psychic trauma might well be called a form of traumatic neurosis—a type which was so frequently found during the war period of 1914 to 1918. Before the war and since, railroad accidents, automobile accidents, collisions and other frightful accidents have occurred, and if they did not actually endanger life, produced a profound mental shock or trauma to the patient's nervous system. These traumatic neuroses show clear indications that they are grounded in a fixation the moment of the traumatic disaster. In their dreams and during their waking periods they constantly live over the traumatic situation and its results, this lasts a long period of time and they simply cannot get through with the traumatic situation. It is before them as a task which is not yet mastered. The traumatic experience is one which in a very short space of time is able to increase the strength of a given stimulus so enormously that its assimilation, or rather its elaboration, or its cure can no longer be effected by normal means.

Many factors are predisposing causes of psychic trauma. The so-called efficiency systems are being tried out in modern industry, where the attempt is being made to turn the worker into a machine. We also find as factors, anxieties, personal habits, poor hygienic conditions, vice, home conditions, fear, the speeding up process, and among these fatigue holds a most important place. Long sustained mental or physical activity, excessive stimulation, draws upon the store of reserve energy and increase the noxious products of metabolism to the extent of causing various degrees of fatigue up to the point of exhaustion. If, added to this, we have a trauma with its consequent shock, we have the production of a profound impression on the psychic side of the individual.

Our patient suffering from psychic trauma has many of the symptoms of true neurasthenia, having such symptoms as weakness, fatigue easily produced, irritableness, is gloomy and introspective. If incapacitated long enough he loses his desire to work, to even read, or do anything useful. Concentration is lacking and his great preoccupation with himself is a marked symptom, he talks about his physical affliction, lacks confidence in himself, has no self reliance, no stick-to-a-tive-ness, and wavers; but there is a real difference between the two, the neurasthenic complains of various bodily ailments which cannot be verified by physical examination, while in psychic trauma the sufferer has really been the victim of a trauma of varying degree of severity.

In hypochondria again we have symptoms resembling those of psychic trauma. Hypochondria is really a symptom or symptom complex, and to a certain extent represents an exaggerated preoccupation with one's body or organs. This in acute illness or injury may be a perfectly normal reaction, but if it continues indefinitely it becomes abnormal. The hypochondriac is not at all amenable to suggestion or psychotherapy and stoutly resents any aspersion on the authenticity of his ailments, differing again from the victim of psychic trauma.

Psychic trauma or traumatic neurosis would come under a classification by Weschler of actual neuroses. The first being anxiety neurosis; second, neurasthenia; third, hypochondria, and the fourth the traumatic neurosis. These in turn would have to be differentiated from hysteria and its various forms, and malingering. Some observers dispute the actual occurrence or existence of a traumatic neurosis, or psychic trauma, but recognize a traumatic hysteria. Those of us who have followed traumatic surgery cannot help but be convinced of the presence of a train of symptoms which seem to be clearly allied to the true forms of neuroses and which, for a considerable period, are beyond the patient's own ability to either help or control. They have to be helped by the physician or surgeon, to be taught that a local injury or lesion is local, and that their mentality is not affected.

Among the symptoms to be contended with, we frequently have an inferiority complex developed. This is due first to the injury and its severity, again to slow recovery of health or function or both, also to fear of inability or possibility to get original job, or apprehension that it will be impossible to perform the duties satisfactorily and keep up the necessary speed. Again we have the fear of unemployment; a fact which leads to this thought is that workers are aware of the fact that frequently after injury a man is let out. Self reliance and confidence are gone. They prefer to be leaners rather than doers. This gives us an important problem to solve and it is largely a function for the physicians and the surgeons to assist by educating the employers and the public to the realization that men must work, and work must be provided for them whether they be only partially fit physically from the standpoint of perfect function of their bodies in a purely mechanical way, or whether they only have partially perfect health. Industry and the world must realize that a man who has tuberculosis in a mild form must work to support his family; a man who has been injured must work, and for both of these classes work should be selected which they are capable of performing.

We divide accidents which produce our greatest number of cases into six groups:

Group I.—The slight type, where a man may go back to his work after first aid has been rendered and return for dressings.

Group II.—The partial disability group, cases of only moderate severity. Here, instead of laying a man off, work of a lighter variety can be selected for him. This selection should be made by the plant physician and the plant superintendent. This plan is far better for the man for three reasons:

(1) The man's wages go on and this means much to the man and his family, and he is usually glad to stay on his job.

(2) It is not good for a man to loaf. It breaks into his regular habits of sleeping, eating, working, and resting, and gives him a chance to form wrong habits. He is thrown in with or among other loafers, forming a wrong attitude toward life and soon learns to love the life and is tempted to lay off at every opportunity.

(3) To keep a man on the job promotes a more rapid recovery from injury. It lessens the effects of his psychic trauma and we should not further traumatize him or cause unnecessary pain, and this can be helped or prevented by cooperation between surgeon and superintendent of the works, watching the man until he can be returned to his regular job.

Group III.—Here the man is really disabled but only loses a few days from work. He does not have to go to a general hospital but can return to work as soon as he is discharged by the physician.

Group IV.—The general hospital case, with a long period of disability. We find here, in most instances, the man is not the same after a severe injury and spending a considerable time in a general hospital and a prolonged convalescence. He has been traumatized in a physical and a psychical way, hospitalized and loaferized. Consider here the above three: traumatized, hospitalized and loaferized. The severe shock leaves a lasting effect on his mind, weeks of pain and discomfort have further exhausted him, and in nine cases out of ten nothing has been done to combat his psychic trauma or his traumatized mentality. The man's batteries have been burned out, mental and physical, his resistance shot, and he soon learns that by exaggerating his sufferings he may gain, or at least he will try to gain more sympathy, attention and service from friends, nurses, internes, and surgeons, and he begins to demand it. After the severity of his pain is over and he becomes convalescent, he loves the hospital life and is loathe to leave it, and by lying about his pain he can prolong his stay or his convalescence and the temptation is great. After leaving the hospital he learns to loaf and likes it, and puts off his return to work as long as possible. If his injury has been a crippling or a maiming one, he is in danger of drifting down to the last stage of pauperism, not so much from his injury but because no one has realized that his psychic injury was really more or at least as important as his physical injuries. Here is a real task and duty for the physician. Suggestion and supervision of the man's psychic side by a dominant personality is the remedy. This must be started at once, immediately after his injury. He was a self respecting, self supporting man, and the going back idea must be put back in his brain and kept there, before his morale is broken. On every possible occasion he must be reminded that he is going to recover and go back to work a useful man. When such a man goes back to his work, his work must be selected for him and it must be made sure that what he does is not fatiguing, for if it is, his desire to loaf and lay off may reassert itself. After a fair test at his work, it may be gradually increased until he can resume his regular job. A man may be injured and his will impaired but his brain functions and work must be found for him.

Group V.—Here we have injuries so severe that a new job must be learned, such cases as amputation of an arm or leg, or an eye lost. With both arms or legs gone, or both eyes lost, men have been trained in useful occupations but only because their psychic trauma was recognized and treated. There is no excuse for an able bodied man, even though crippled, selling lead pencils on a street corner or begging; he should have been stopped somewhere in his descent from a self-respecting producer to a beggar.

Group VI.—The group of crippled or maimed who cannot be taught jobs in their own plants is smaller still than the others. In small plants this is difficult, but easier in a large plant. Here the physician must be able to sell this idea to the plant to prevent pauperization. These men should be taught jobs outside of their plant and arrangements should be made to make this possible.

A man suffering as a result of an injury while the neurosis or psychic trauma is present, even though he is perfectly sincere and honest in his desire to get well and go back to his job, is often misjudged and looked upon as a malingerer or faker. He is very like the poor fellow who has been shell shocked. He is shot in a psychic way and he cannot function properly, mentally or physically; his coordination between the two has been injured. His injury has been a distinct shock and a trauma.

We recognize surgical shock or traumatic shock, the result of injury, and know this shock is frequently out of all proportion to the injury. So it is with psychic trauma, this does not necessarily mean that the injured person needs to have been injured as severely as some classes which have been described. The principal point to remember is that our patient has been injured and has been traumatized, and with his physical injury has come this mental change. We cannot as yet locate a lesion produced by this trauma, the reason being that we have no positive way of analysing the part of the mind, or brain, or nervous system, which is the seat of the actual traumatism or shock. We know positively, as previously mentioned, that in fatigue changes take place in our economy, yet we might have trouble in actually isolating the katabolic substances which by their multiplication cause fatigue and its manifestations; so it is with psychic trauma. Changes have taken place in the injured man's consciousness and our means of determining them depend upon our ability to examine, diagnose and treat such a case, and to do each intelligently and without prejudice. Here we find a man who cannot tell himself just why he is different than he was before he was injured, but he is different. He is nervous, easily upset, on edge, restless; he is scared; his confidence is gone; he is suspicious, fearful, distrustful of the people about him, of doctors and nurses, fearful that he will not get a square deal, fearful that his injury is greater or more serious than he has been told; he is restless at night, suffers from insomnia and many other symptoms. If his trauma has been to one of his members, he is fearful lest he will not regain its normal function. He is often drugged to give him sleep and ease the pain, and this procedure does not do him any real good but adds to his already depressed mental state. He comes to be regarded as a neurasthenic or a crank, all because, in many cases, the true nature of his condition has been almost entirely overlooked or at least not regarded with the significance it justly deserves.

If we look at this picture without bias, we can see how hard it is for an honest man, suffering from his physical injury plus his changed or injured mentality, to obtain just compensation before the lack of intelligence which is usually exhibited in a political compensation board or before the average referee. He also has to face a contest with an insurance company which is represented by an attorney whose sole sense of duty is to try to win his case for his company. Again, frequently, the physician who is the surgical representative of this same company is also ambitious to keep down the expenses of the company, by keeping down the compensation to its lowest possible level, and returning the injured to work at the earliest possible moment. This physician, often because of lack of knowledge of the real damage done to a man's psychic being, will also, because of his lack of knowledge of psychology, minimize the seriousness of many cases. The only chance the average man has, is to be represented by a physician who, by reason of his training mentally, and his appreciation of not only the physical side of his patient but also a keen sense of appreciation of the symptoms we are pleased to call psychic trauma, has the courage to defend a man who is a real sufferer and would gladly, because he is honest, return to work and once again become a self respecting worker and a producer and not be willing to be driven down the scale to possible pauperism because of his inability to get in condition to work.

In the handling of these cases the insurance company usually takes a case from the hands of a physician or surgeon after a given number of days, refusing to pay

for his treatment after that period, or by intimidation or misrepresentation, try to force him to go to their clinic. If he does not progress well, he is frequently allowed to drift, and, usually, because of lack of financial stability fails to obtain proper representation or justice, due to his inability to have any one of competence appear in his behalf. He then becomes a pitiful picture when opposed by the paid professional talent of the average insurance company.

One more point should not be overlooked in dealing with cases of this type and that is expert testimony. This should be testimony of facts as facts exist and only the result of honest opinions after careful study of the facts as found and presented, and should never be the leaning toward the side by which one is paid simply because of the payment. It has been my experience in testifying in court and before compensation boards to hear testimony of experts, where, either due to absolute ignorance of facts as here presented, or the willingness to perjure themselves, attempt to damage a sincere and honest case, endeavoring to create the impression that the patient was not only a malingerer but a liar as well.

The prognosis and duration of disability in industrial accidents are the result of a combinaton of factors, including the surgeon and his equipment, his management of the case, and the patient himself. His mental condition, his love of idleness, his tendency to exaggerate, his financial motive when compensation and insurance benefits exceed wages, and the various neuroses following a severe injury, are powerful factors in prolonging disability. The mental obstacles which keep the man from returning to work must be met by suggestion begun early. Patients with a partial disability are usually better for working at a selected job. Illness, injury and idleness break down morale. Whatever the term of disability, it pays to get the man back to work at the earliest possible moment that he is mentally and physically fit to work.

The treatment is best carried out by physical therapy and occupational therapy for his physical condition, and psychotherapy for his mental side. His morale must be built up and confidence instilled; he must be dominated by a kindly yet positive character capable of understanding, but with the fixed purpose, by applied psychology, to remake this type of patient. He must always have held before him the one idea, the slogan of the Salvation Army, "A man may be down but he is never out"; the fact that he can come back and be capable and useful; and that in spite of any affliction he has a brain and it can function. The great objects of treatment are to save life, minimize suffering, promote healing, restore function mental and physical, get the man back on his job as early as possible, make a useful worker self-supporting, self-respecting and independent, ashamed of charity or a dole, representing in himself the true spirit of democracy—a willingness to do, to work, and be independent.

Philadelphia, Pa.

Imitation In Childhood—Its Value and Its Dangers

By Edward A. Strecker

Just as the tiny body of the infant must depend on the environment for fresh air, sunshine, food and other things that contribute so largely to its growth and development, so must the miniature and unformed mind find in the environment the stimulus it needs in order to expand and mature. Probably, the most important source of such stimulus is IMITATION. So important is it for the child, that in all likelihood the ability to speak the native language is the direct result of imitation. Certain sounds are heard by the child. At first they are utterly devoid of meaning. Gradually there is an association between the sounds and the happenings that follow them. Thus they acquire meaning for the child and are repeated as a word or group of words. The natural play life of children furnishes a striking example of the powerful influence of imitation. From time immemorial the female child has taken a piece of cloth or a rag or whatever was available and draped it about herself in imitation of the skirt of her mother. In playing house, children faithfully portray their parents, not only their virtues but also their faults. It would be profitable if parents could watch these games. Likewise might school teachers get a fairly good record of their own short-comings, if they observed children playing school. Obviously imitation helps to make the mind grow. Naturally children cannot discriminate as to what they imitate. Good and bad alike, that which builds usefully for the future and that which is destined to interfere with efficiency and happiness, are both ingested as readily as is food.

Imitation in children is very strong and active. Psychologists realize that children are forced to imitate, first their parents and later those with whom they come into intimate contact. Psychologically speaking, children are weak and afraid and they gain strength by idealizing their parents. It is borrowed strength just as in adult life many of us find strength and security in worshipping our heroes and striving to imitate them. In this way we supplement our weaknesses and put a glamour on our mediocre lives. Children imitate and believe in their parents very directly and completely. Shakespeare said, "The voice of parents is the voice of God," and so it surely is. Some of us may remember the firmness of our childhood belief in the opinions of our parents. We were willing to fight for them. The only thing needed to settle any argument was the magic formula, "My father said so," or, "My mother told me so." In our tender years we all used this borrowed strength, this process of idealistic imitation. It became inculcated into the personality, and is one of the important things that determined its present characterstics. It is not that we were actually defending the opinions of our parents. There was scarcely enough intelligence to make any logical defense. We were not listening to PROOF from the lips of our parents. That they said so was enough. Thereafter we defended emotionally the citadel of strength that they represented.

Each one of you who is a parent does represent a citadel for your children. This citadel must not be allowed to crash too quickly. I need scarcely tell you, however, that it cannot be allowed to stand indefinitely

in an unchanged condition, for that would be flying in the face of every sensible psychological admonition that the child be emancipated, and given independence. This emancipation must be brought about gradually and tactfully, but it must be complete. The disastrous results of failure to accomplish emancipation may be seen on every hand. Many unwise parents literally "hang on" to their children. They make decisions for them far beyond the time when they should be making their own. They openly encourage children to lean upon them. They continue to postpone the day of emancipation. Finally, it is too late. The parents have succeeded in selfishly perpetuating themselves in their children. The dependence once begun never comes to an end. The handwriting is on the wall. Nurses, governesses, teachers and innumerable others form an endless procession of surrogates for the parents. They are slavishly imitated and worshipped. Our universities are filled with adult children, working for their doctorates by the process of imitating without the least discretion, some favorite professor. The doctorate means little or nothing in terms of real culture. It is imitation run to seed.

The moral concerning imitation may be reduced to a simple physical parallel. If we wish to save our children from the tragedy of the weakling and see them grow strong and healthy, we must be sure that they are given the right physical conditions of life. If we wish to start their minds and personalities in the right direction, if we wish to prepare them for what I take to be the most important issue in life,—namely, psychological maturity and independence—then we must give them the things to imitate that will contribute toward that end. This is a direct charge to parents and in fact to anyone who has any part in the making of the environment for children. It should be filled with qualities to imitate that may be counted on to build soundly and enduringly—honesty, straight-forwardness, truthfulness, courage, reflection, judgment, decision—and free from the opposites of these attributes. A bit of introspection should enable us to pick out those things in ourselves that sprang from imitation in childhood and that have seriously hampered us in adult life. It might be well to do all we can to prevent our children from being similarly burdened.

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Electropyrexia by Means of a New Type of Diathermy Electrode

By H. E. Kimble, M. D.,[1] and H. J. Holmquest, B. S.[2] (M. E.)

When administering high frequency currents for either local treatment or for producing fever, it is important that uniform electrical contact between the electrode and the skin of the patient be secured. Obviously, the electrodes used must be very flexible in order to secure such contact, especially when the part of the body to be treated is irregular in contour. Furthermore, the conductivity of the electrode which is electrically in series with the tissues of the patient must be greater than that of the skin and superficial tissues. Otherwise, the electrode would heat more rapidly than the superficial tissues on the application of an electric current and before the tissues had received an adequate treatment would attain a temperature sufficiently high to burn the patient. Another requirement of a satisfactory electrode is that no cracks develop in the electrode and that it have no sharp edges or projections. Such imperfections result in concentration of current and the excessive local heating ordinarily referred to as "hot spots."

Various electrodes have been designed and put on the market for diathermy application. There, however, has been no marked departure from the type used a quarter of a century ago. In general, the material of which diathermy electrodes have been constructed has been a more or less flexible metal foil. An attempt has been made to facilitate the moulding, when applied, of the foil electrode more closely to the surface of the body by perforating the foil and sinuating the periphery of the electrode. The procedure has been successful to a certain degree—in fact, this design has made available the most satisfactory foil electrode and the most satisfactory of all diathermy electrodes up to the present time.

The authors, early in their investigation of electrode design, realized that solid metal electrodes could not be made more flexible than had already been done by Neymann and Osborne in their design of electrodes for electropyrexia and still withstand hard usage. Therefore, attention was directed to research on a new type of conductive material which would have the desired flexibility. After extensive investigation and experimentation, a material possessing the desired physical and electrical properties was produced. This material consists essentially of a mixture of an adhesive substance and a highly conductive metallic powder in such proportions as will give maximum conductivity with maximum flexibility. While yet in the plastic state, this material is formed into electrode surfaces of the required size and shape. After these surfaces are processed, the material becomes highly conductive and flexible. During processing, the electrode surfaces become securely and permanently fixed to a metallic mesh. This metallic mesh is specially woven so

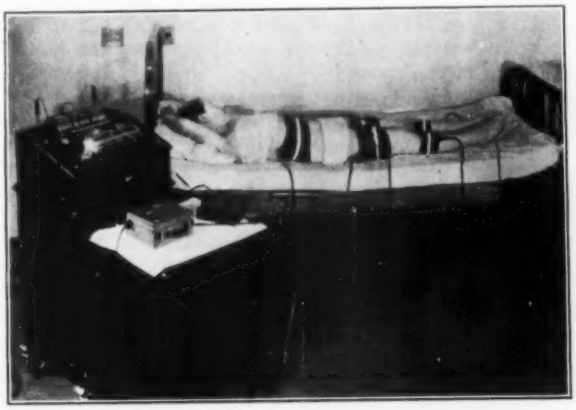

FIG. 1

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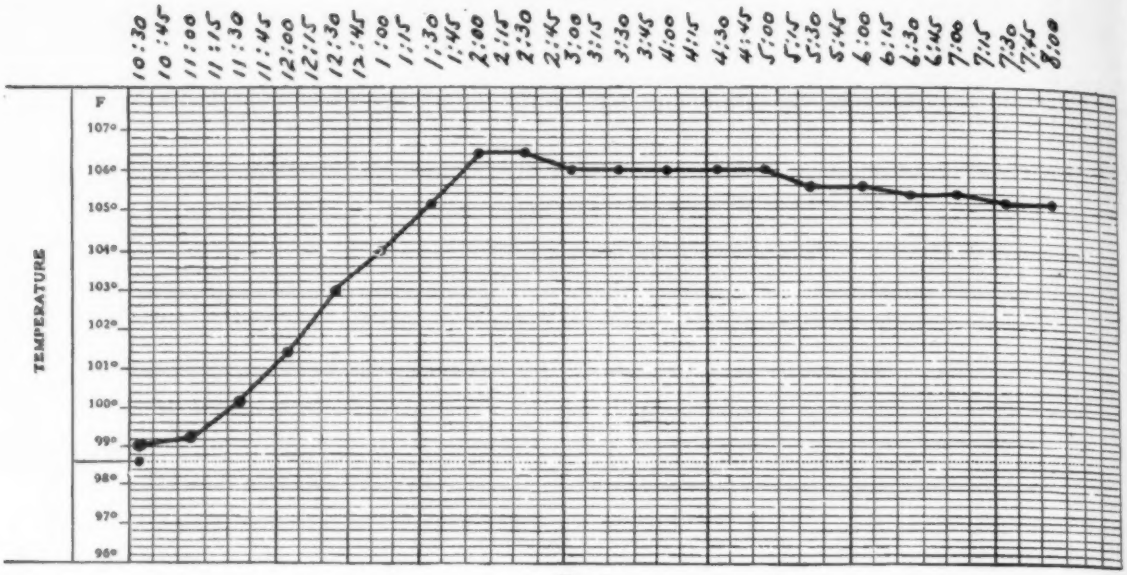

FIG. 2

as not to impair the flexibility of the electrode surface. Multiple electric contact with the mesh is made by means of a "fanned out" stranded conductor. The entire electrode is backed with a highly resilient, flexible rubber. The electrode in its finished state consists of a lead-in conductor, rubber backing, current distributing mesh, and conducting surface, permanently assembled into a single compact unit.

Use of this electrode with an appropriate electrode compound should materially reduce the possibility of "hot spots" and diathermy burns. An electrode of such high flexibility is easy to apply, perfect apposition with the skin being secured without the application of excessive pressure. It has no sharp metallic edges and projections to cause high concentration of current and resultant burns. If, after very long or careless use of the electrode, its surface should crack, no arc will be established between the separated portions of the surface because the underlying conducting mesh will keep the entire electrode surface and all parts of it at the same electric potential.

Cuff and belt electrodes for production of fever by diathermy have been successfully used by Dr. Arthur C. Jones of Portland, Oregon. Electrodes of this type were constructed of the new material developed by the authors. Fig. 1 shows the electrodes applied for the administration of a fever treatment. In Fig. 2 is charted the rectal temperature of a patient given electropyrexia by means of these electrodes. In this treatment the rise in temperature was deliberately limited to 2° F. per hour.

The Importance of Posture*

By Maud Forrester-Brown, M.S., M.D., Lond.

"The Importance of Posture" is my subject, and before we can agree as to its importance, we must decide what we mean by posture. In the sense in which I shall use it, it will not be restricted to the narrow meaning of the carriage of the body in the upright position, but rather will imply the correct use of the body machinery under all circumstances.

In these days when most people have some knowledge of motor car machinery, we all realise the great increase in wear and tear to a machine that occurs when its parts are not in their correct mechanical adjustment, and we know that the most efficient service cannot be got under such conditions. Yet the very people who are most particular to have the wheels of their car true, so as to wear their tires evenly, often pay no regard to the mechanics of that exquisite machine, the human body, which has been entrusted to them, and of which they can purchase no new model when they have abused the old.

It is true that the human body is a wonderful self-adjusting machine, that it can and does modify itself to meet the stress of all sorts of unfavorable conditions; but it does not thereby follow that such modifications improve its efficiency as a machine. The old case of tuberculous spine, which has healed after the collapse of several vertebrae, manages to live and even to work with thoracic and abdominal cavities in which the vital organs are crowded into about a third of the normal space; but such a patient does not have a normal capacity for running or climbing hills, and no one would consciously choose to have their organs crowded in such fashion. Yet many even of the wealthy and the reputed wise are *huddling their organs* under conditions just as unfavorable, simply from lack of attention to some plain mechanical principles.

One meets people, even among trained gymnasts, who say: "But *what is* the *correct* attitude for the human body? Why, persons with very crooked backs have written great books, or attained greatness in some other sphere!" As if those same persons might not have written the same book—and probably a much more optimistic one—even with a straight back!

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The answer to the question is at hand in many forms. We carry it within ourselves when we instinctively offer our confidence and friendship to the person who walks to meet us with springy step, head erect, and frank eyes that look straight at us; while we hesitate before we trust the one who slinks by with bent back, drooping head, and shuffling gait. That is the result of individual experience, much of it subconscious.

Throughout the ages experiments have been carried out on a vast scale, experiments quite as scientific as those done in the laboratory, whose results are vouched for by brains as great as any at work to-day. These results are recorded in art, in literature, in our common speech, alike in proverbs and in the accepted metaphors of everyday language. For instance, it is usual from Biblical times onward to speak of an "upright man," and of a "coward shrinking," implying that a straight spine goes with bold, honest conduct, while defective muscle-tone is the accompaniment of retreat and hesitation.

You have only to spend a few minutes in the British Museum or the National Gallery to see what the great artists thought of the matter. What gods, or warriors, or heroic saints will you find with hollow chests and the signs of neglected rickets, or of want of exercise? It is true that early Christianity, in its appeal to the slave classes and lower orders, who, poor souls, have not in any age had much time to attend to the general efficiency of their bodies, did tend to overlook the intimate connection between soul and body and to sacrifice the latter to the supposed interests of the former. The Dutch realists have also shown us that the laboring classes did, in an unenlightened age, develop very ill-balanced bodies and, if one may judge by their facial expressions and occupations, very ill-balanced minds also.

Now-a-days, when we have the benefits of the film and the cheap novel, who ever wants to see or read about a hero—I exclude the comic artist—with flat-feet, knock knees, a hollow chest and poking chin? No, whatever may be the sins of the cinema, its enemies must acknowledge that the film stars set an ideal of physical efficiency before the young of the nation. It is true that until our national school training is improved, these standards will continue to react somewhat hardly on the young lovers of actual life.

As no lantern was available for me to show you different types, I have brought a simple chart, which the United States Government has issued to all its schools. The left-hand figure, representing the correct standard, is composed from the photos of a number of successful college athletes, the men from Harvard. The right-hand figure, with very faulty balance, is similarly composed from photos of students who had a bad health record. It is a type which, I regret to say, is all too common in our British schools to-day, the elementary and the secondary alike. However, in my experience and that of others with much wider opportunities for observation, it is not a posture which is spontaneously "grown-out of," but, on the contrary, becomes fixed in the course of years by structural changes in bones, ligaments, and muscles which can never be entirely undone.

As to the actual lines of the spinal curves, there are many differences of opinion, probably due to the misapprehension that there should be one standard. A careful study shows that the spinal curves of healthy individuals vary with age, sex, race, and occupation. For instance, the Hercules type has very prominent buttocks and a deep lumbar hollow, whereas no one would think it desirable to try and turn the average citizen into a Hercules. Conversely, Cunningham, in a very interesting monograph on the lumbar spine, demonstrated that in certain primitive races, who squatted a great deal, the lumbar lordosis was much reduced from the European standard, so that the use of chairs must have an influence on it. In the rural school with old-fashioned benches, guiltless of a back, it is quite common to find a lumbar kyphos in the pupils. This should be borne in mind in using for classes the numerous squatting exercises which the Danes have made so popular with our school gymnasts.

In connection with this variation of human types of spine, Goldthwait, of Boston, who has made a life-study of the subject, has compared them to the race-horse and Clydesdale among horses, and has labelled the former the "Uncle Sam," and the latter the "John Bull" types—another instance of scientific observation by artists. Goldthwait points out that the variation is not restricted to the spine, but applies to all the organs, so that the "Uncle Sam" has lax joints, rather atonic muscles, long mesenteries and mobile viscera, permitting, when conditions are unfavorable, visceroptosis and all its symptoms. The "John Bull" type conversely is not subject to this latter disability, but with rather stiff joints and short muscles gets more readily strained, and in later life tends to develop osteoarthritis of the joints, with bony spurs and eroded cartilage. The second type cannot be "mobilised" readily by any system of exercises, but is efficient for heavy labor.

This is a point which is often overlooked by remedial gymnasts in their treatment of a case, for they spend—or, at any rate, the old-fashioned ones used to spend—a great deal of time trying to mobilise a case with short hamstrings and close-set vertebrae; whereas it would be far more profitable to put one's efforts into teaching the *best possible balance* on that patient's natural axis.

I take it then that we are all agreed that the correct standing position is attained when the body axis is a straight line, sloping a little backward and downward, passing through the lobe of the ear, the side of the hip-joint, just behind the knee and just in front of the ankle, or, in other words, the ankles should be dorsiflexed just beyond a right angle (which necessitates a free tendo Achilles); the knees should be straight (hamstrings taut); the hips well extended (flexors taut and Y-shaped ligament taut); the curves of the spine reduced as much as reasonably possible, the chin retracted and back of the neck well stretched.

This attitude keeps the calf muscles taut, so helping the arch of the foot; it reduces the strain on the quadriceps and glutei, the anti-gravity muscles of the knee and hip; it maintains the abdominal cavity in the shape of an inverted pear, thus giving no encouragement to the heavy organs in the upper part (liver, spleen, stomach) to slip downward. The lifting of the lower ribs gives stability to the attachments of the diaphragm, and allows it room to spring full up in expiration and empty the base of the lungs well. People are apt to forget that the maximum cubic capacity of the lungs is at their bases and their filling depends mainly on the depth of swing of the diaphragm; while movements of the upper ribs are inconsiderable at any time, and though these are assisted by arm-lifting, this is more than counter-balanced by the fixation of trunk muscles needed to steady the upper limbs. Therefore the fullest respiration is obtained with the arms relaxed, or only slightly raised. In the correct, upright posture the diaphragm is further assisted by the pull of the deep cervical fascia on its tendon, through the pericardium to which both are attached, a pull which also steadies the heart in good position.

When the full piston action of the diaphragm is obtained, a great pumping effect is felt on the abdominal veins, which empty rhythmically into the thorax and auricles, thus greatly assisting the work of the heart. In addition, the liver is subjected to rhythmic compression,

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a form of massage which must assist its action. When we remember that practically all the blood from the digestive organs passes through it to have the food stuffs made suitable for assimilation, or storage, we see what an important factor this must be in keeping the body healthy. A lax abdominal wall means sagging, congested liver and bowels, ill-ventilated lungs, strained heart. Can we wonder that the subject of these ills is likely to be lethargic, depressed and ready to fall a victim to bacterial attack, all of which latter further lower muscle-tone, so that a vicious circle develops, a circle most easily broken at the mechanical point?

To recognise good posture is easier than to teach it, and no unanimity of method prevails as yet. Let us first consider the factors which interfere with the maintenance of the in-born tendency to good posture in the normal individual. These begin to act very early in a child's life, but before we can appreciate them justly we must recognise what it is that maintains the various parts of the body in their normal relation to one another. This is nothing other than a constant, elastic contraction of the voluntary muscles, "muscle-tone," as it has been named, in contrast with "voluntary contractions," which serve to move the parts on one another. The old-fashioned idea that in standing the bones were held in one place, one on the other, by the ligaments, has been quite abandoned, for the most stable joint in the whole body, the hip-joint, will dislocate when its muscles are thrown out of gear by infantile paralysis, while the contortionist, as long as his muscle-tone is good, only dislocates his joints at will. Ligaments are now recognised as the sentinels of the body, richly supplied with nerve-endings, and ever alert, ready to cry out if sudden excessive strain is put on the joint. Chronic and repeated, intermittent strain gradually wears down their guard, so that the joint becomes lax; but even then it does not give way unless the muscles are subsequently or simultaneously damaged.

This quality of "muscle-tone" has been proved to differ from ordinary elasticity in that it is a property of living tissue only, being lost at death, and it has been proved to be dependent on the intactness of the nerve connections of the muscle; in other words, it is a *reflex* phenomenon. This was proved by the classic experiments of Sherrington and has been confirmed by the more recent work of Rudolf Magnus; but though much light has been thrown on it, it is not completely understood yet. The most difficult thing to explain is how movements, which in the first instance are done voluntarily and with much conscious effort, come by repetition to be performed automatically, without fatigue, and often without making any impression on the consciousness. Similarly, attitudes which at first are taken up with effort and maintained for a few moments with great fatigue, become after a time habitual and can be held for hours without strain. It is on this possibility of converting voluntary movements and positions into automatic ones that all posture training depends. It must never be forgotten that there are many types of voluntary contraction of muscle: single, irregular ones, rapid repetition, possibly with incomplete relaxation between the contractions (very fatiguing, because there is no time for the toxic products of muscle action to be carried away); also slow rhythmic ones, contractions with gravity, against gravity, and in the neutral position; also contractions with the muscle at its shortest, and again with it fully stretched. Some of these forms are more suitable than others for developing postural tone, that is, slow, deliberate ones, rather than rapid, ill-managed ones; while it is a fundamental principle that very weak muscles should be trained with the assistance of gravity, not against it, and in the short position, not when fully stretched. In fact, the methods which are applied to the training of muscles recovering from paralysis, such as poliomyelitis, should also be applied to the muscles of a case of faulty posture from poor tone.

As we have said already, muscle-tone is maintained reflexly. You will remember from your physiology days that a *simple reflex* consisted of the passage of a single stimulus up a sensory nerve across a synapse in the central nervous system and down a motor nerve with the resulting appearance of a motor response, which was constant for all similar stimuli of sufficient intensity. Such a very simple phenomenon cannot actually occur in the human nervous system, because innumerable sensory stimuli are constantly streaming in from all parts of the body surface, as well as from the special sense organs, and the impulses from these overflow in all directions, reacting on one another; while a constant stream of inhibitive influences pours down from the higher centres in the brain to those below. The bewildering effect on the uninitiated of a central telephone office is nothing to it. The maintenance of the upright position, or, of course, any position against gravity, depends on the co-ordination of all these in-coming and out-going stimuli. Therefore any one who thinks in terms of a single muscle, or even group of muscles, is completely lacking in comprehension of the mechanism with which we have to deal.

What we have to train is the *body as a whole*, and we have to remember that every joint surface, every tendon, every muscle-fibre is contributing its message to the general chorus of incoming stimuli. Therefore we can often influence a movement or a position more easily by cutting out some of these sensory impressions, that is, by reducing the strain on a joint, than by attempting to alter the direct motor stimuli. Thus when the patient is standing, impulses are going from the *balls of his toes* which reflexly stimulate the tendo Achilles to shorten. What folly, then, to try organic stretching in this position. On the other hand, when the tendon is known to be stretched sufficiently, it is important to see that this *reflex* does not cause the patient still to walk as if it were short; in other words, he must be taught to inhibit the reflex to within its normal limits. This is a most important point in the re-education of spastics with equinus; one too often sees the masseuse trying to dorsiflex the foot by pressure under the balls of the toes, by which she is actually calling forth a contraction of the calf muscles; and also the heel, which has been successfully stretched in plaster, may come up again the moment the patient bears weight on the foot. Spastic cases demonstrate this most dramatically, but the principle applies to various types of flat-feet also.

We have referred to the simple reflex from the sole of the foot to the heel of the same side, but must remember that this is complicated by *contralateral* reflexes, which are still confined to the spinal cord, but cross from the limb of one side to that of the other. These play their part in the alternation of the lower limb movements. There are also the reflexes which compel one muscle to lengthen while its antagonist shortens; these are overridden in the act of standing, for the muscle-groups of both sides of the limb have contracted simultaneously, that is, quadriceps and hamstrings. Now when we want to mobilise a joint we should get the patient to stretch it actively in such a position that the right antagonists relax, that is, full extension of the knee should be got by contracting the quadriceps with the patient supine; gravity being in favor of the short hamstrings, they actively lengthen; whereas if the patient is prone, they are reflexly stimulated by the weight of the limb. The same can be used to train a weak quadriceps against

gravity, provided it is not asked to lift the limb but is only asked to support part of the weight, while the masseuse supports most of it; then the weight will reflexly stimulate the muscle to its greatest possible contraction. This is no contradiction to the training aided by gravity, which has already been referred to. These phenomena are more easily noted in a superficial joint like the knee, but they should be borne in mind in dealing with the spinal joints.

As already remarked, stretching requires relaxation of the antagonistic muscles, but balance demands simultaneous contraction of opposinng groups and requires careful training in positions which facilitate it at first.

We have so far only considered the reflexes which pass through the spinal cord; these, however, are subject to modification by far more powerful ones whose sensory stimuli stream in by the special organs of sense, especially the labyrinth. The great function of these centres is to keep the head upright and above the body, so that there is a constant interplay of reflexes and of muscle-adjustment between the neck and head, and between the neck and segments below it. Predominant again over these are the centres for the eyes and for the extrinsic muscles of the eyeballs. The essential function here is to keep the transverse axis through the two eye-balls horizontal, and all the parts below are sacrificed to this end. This is well shown in cases of extensive disease or destruction of the spinal column, such as the old kyphos to which we referred before. In practically all these cases the eyes face forward in spite of any progress of the deformity, and usually at the expense of the thorax and abdomen, which are crowded almost out of existence. It should be the aim of treatment to keep the eyes horizontal without this sacrifice of other organs; but to do so it is necessary to harness all these reflexes to one's service, not to ignore them nor fight them blindly.

One often hears it said that if the head is held up, the rest of the spine will take up a good attitude. This by no means follows, as experience, as well as theory, shows. Contrariwise, if the feet, knees, hips, and lower segments of the spine are progressively set right, the reflexes for the horizontal position of the eyes will collaborate in bringing the head into good position.

Incidentally, purely mechanical conditions make it difficult to keep the arches of the feet up if the position of the knees, that is, knock-knees, throws undue strain on their inner border; and the converse is true as to the effect of flat-feet on the knees. We must never forget the two factors, mechanical and central-nervous.

Before we leave the factor of nerve control, let us not forget that all the lower centres and their inflexes are subject to *inhibition* and other modifications by the cerebrum and the emotional centres.

The artists and authors of whom we have spoken have shown us in a striking manner how much the emotions influence posture: grief huddled on the floor; terror crouching in a corner; rage flinging around its limbs. We know by personal experience that health and success make us hold up our heads and walk the earth lightly; whereas fatigue, illness, and unhappiness make us droop and drag our feet heavily around. We also know, if we are wise, that forcing ourselves to adopt an upright, buoyant attitude has a wonderful effect in reviving our spirits. Indeed, Darwin, in that fascinating book, "The Expression of the Emotions," contended that it was the bodily attitude which produced the emotion, not the reverse; and some actors have upheld his theory. Anyhow, the position which allows free ventilation of the lungs, unhampered action of the heart, and a good circulation through the liver must be best for the brain.

Having considered the basis of *muscle-tone* we may now look at the factors which may impair it. Foremost among these is *fatigue*, whatever its cause. Experiment has shown, what our own experience confirms, i.e., that fatigue acts first always on the highest centres of the nervous system, and progressively from above downward. The action that is new to us and is done by deliberate volition soon tires us, and the power to do it is early lost when we are fatigued from some other cause. On the other hand, though half asleep, we may carry out satisfactorily some complex action which has become automatic with us.

If we once realize what a complex nervous process is the maintenance of the body in the vertical position, we shall not be astonished that such a mechanism easily becomes disordered by fatigue, and it does so more readily in the young child in whom the mechanism has only been recently evolved. Therefore, to send a child of five or six to school one or two miles, after a hurried and ill-digested breakfast, and then ask it to "sit-up" in good position for hours, without even a back-rest, is folly, even if it be not called a crime. Yet such are the conditions under which a large proportion of our rural population is being brought up—"educated," the authorities call it.

Another important factor in reducing muscle-tone is the *toxaemia* of illness, whether it be acute illness like pneumonia or scarlet fever, followed by insufficient rest for the weakened muscles, or the chronic poisoning of some condition like pyorrhoea, or constipation, or tuberculosis.

Lack of direct *sunlight* to the skin of the body has been proved experimentally in the last few years to be a common cause of lack of muscle-tone in children, its effect being in inverse proportion to the age of the child, i.e., the rapidly growing bones and muscles of the infant require sunlight more urgently than the tissues of the child of school age; yet doubtless the adult is susceptible in some degree to its influence. We all know the sense of well-being that is induced by a holiday in sunshine.

The quality of the *diet* has also been proved recently by scientific experiment to have a most active influence on muscle-tone, the effect being again most striking in the young. The vitamines found in fresh food, and most richly in foods designed by nature for young animals, exerting their mysterious effects in minute doses, are essential for keeping the nervous system healthy and the muscles well toned up. Hence the modern tendency to use chiefly preserved foods and fruits, grain without the husk, and heated milk, is a most dangerous one.

Another important stimulant, which is in danger of elimination in civilized life, is the contact of the skin of the body with *cold air*. Fortunately the campaign in favour of direct sunlight to the skin tends to assist this. But the substitution of artificial light from carbon arcs in a hot room has quite a contrary effect, and it is doubtful whether the heat of the room, even when counteracted by a final cold shower, has not done more to lower muscle-tone than the lamp can do to raise it in adults. Over-clothing in a warm room is another of the vices of our elementary school system, for the children wear clothes suited to their parents' damp, ill-warmed cottages, while the school is kept at a much higher temperature. To one who is accustomed to a modern open-air hospital the ordinary institution seems grossly overheated.

Heavy clothing and garments which restrict the chest, though far less common among the better classes now-a-days, are still a factor in inducing bad posture, especially among the labouring classes, who have a most unreasonable fear of a cold atmosphere. The Liberty-bodices

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which are compulsory in many girls' boarding schools are very apt to hinder free breathing as soon as they shrink in the wash and the child grows a little. A girdle round the pelvis would be a much safer attachment for suspenders.

In addition to their direct effect in impairing the tone of voluntary muscle, the factors of unsuitable diet and constricted clothing have an indirect effect on the body posture by causing flatulence, distension of the bowel, and *constipation,* all of which result in over-strain to the abdominal muscles, which may be considered the key ones for keeping the spine and trunk well balanced. In the four-legged animal the weight of the liver and stomach falls on the front of the lower ribs, and there is no great stress on the part of the abdominal wall which is unsupported by bone; but in the upright human-being gravity induces a great strain on the anterior abdominal muscles, a strain which increases disproportionately with every bit that they yield and that the viscera sag. Here again a vicious circle is produced, for the more the bowel sags and gets congested, the greater the constipation, which in its turn increases the stress on the abdominal muscles. From the above considerations it is evident that faulty posture is itself a factor in predisposing to disease, while it is aggravated by the onset of illness.

A few diseases may be mentioned in which its effect is special. Thus in Rickets, though the bones may be very soft in the acute stage, they will not deform unless the stresses of unbalanced muscle-action or gravity are allowed to play on them. If the child is kept recumbent till treatment has hardened the bones, it will develop neither lordosis, kyphosis, nor scoliosis. But if, as we commonly see, the flabby infant is allowed to sit all day cross-legged with bowed back, its vertebrae and leg bones will be misshapen, and it will either have a lumbar kyphos, or if coxa vara has occurred with flexion of the hips, it will, when it walks, develop a sharp lordosis to compensate for the pelvic tilt. Then years of exercises may fail to give complete correction.

Another group of cases in which posture plays an important part is that of the congenital wry-necks. If they are merely treated by division of the sterno-mastoid, and their accompanying cervical lordosis with tight muscles at the back of the neck is not dealt with by persistent exercises, they will still poke their chins and are almost certain to relapse into the old habitual tilt. It is only by insisting on general good posture that they can be made to look the world squarely in the face.

The same remark applies to all the postural scoliosis cases, for if they are only treated by exercises to undo the lateral curve and their general antero-posterior slouch is neglected, they will relapse at once. Conversely if the tone of the abdominal wall is raised and their general balance corrected, the lateral curve will disappear spontaneously.

The greatest authorities on organic scoliosis (with bone changes) seem to be coming unanimously to the conclusion that, if the general body posture can be improved and most of the kypho-lordosis eliminated, the lateral curvature will become relatively inconspicuous and unimportant; whereas if all the treatment is directed to mobilising the rigid area and regard is not paid to body balance in general, relapse is certain.

We have already considered the postural factor in tuberculosis of the spine. The dramatic results which Rollier has shown at Leysin are based on the judicious production of secondary curves to compensate for the kyphos without altering the general normal axis of the spine. The same factors apply with old anchylosed tuberculous hips. If they are fixed in flexion, they make it easier for the patient to sit, but they necessitate a lordosis when he stands, which may have very deleterious effects on the rest of the body.

Modern work has drawn attention to the frequency of chronic strains at the base of the spine, notably in the sacro-iliac and lumbo-sacral joints, and to the effects of faulty mechanical conditions in perpetuating what may have started as an acute tear of muscle or ligament. There is no time to go into so big a subject now, but it should be borne in mind that no success will be attained in the treatment of these cases unless the mechanical factor is borne in mind.

In many, many cases of fibrositis and other forms of chronic rheumatism, mechanical strain, whether of flat-foot, keeping up the lesion in foot or knee, or old rickety knock-knee, unnoticed till the infection supervened, or of tilted pelvis with lordosis, or of drooping head straining the lower cervical joints—in all these the mechanical strain will suffice to localise the lesion and to hinder its cure.

My subject is not the treatment of postural defects, but I hope what I have said about their production may suggest the lines of cure, and I cannot close without a brief summary of these.

Prevention, as with all diseases, should play the major part, and it will consist in:—

1.—Judicious *dieting* with attention to the provision of sufficient vitamines (in fresh meat, fruit, vegetable), and the reduction of excess of carbohydrates, especially sugar and potatoes, which may ferment and distend the bowel, these precautions being most essential for infants and young children.

2.—Exposure of the body to the maximum possible direct *sunlight,* or failing that, winter courses of artificial sunlight.

3.—Light, *loose clothing,* with opportunities for letting cold air play on the skin. Shivering, when not carried to excess, is a useful exercise.

4.—Sufficient *rest,* both at night on a firm mattress under light bedding, and also after meals, in an attitude that does not hamper digestion. Growing children should certainly lie down for half an hour after their chief meal, and this should be arranged for in our educational system.

5.—Provision of *seats* in schools, work-places, and the home with wide seat, sloping back, and support for normal lumbar hollow. Invalids should be supported in bed with a firm back-rest and pillow under the knees when not recumbent. They are usually allowed to huddle down among a bunch of pillows. When flat they should have a small cushion to fill the lumbar hollow, and when convalescent they should be got up into a chair with straight sloping back, not a sagging canvas one, and should again have the lumbar pillow.

6.—Correct, balanced standing and walking should be taught to all school children and to all patients under treatment; it *does not come naturally* to all young children, indeed, to few under the artificial conditions of civilised life, where their instincts for frequent crawling and rolling on the ground are constantly checked. Patients who get up for the first time after a long illness should not be supported on one side by an attendant's arm, but should walk in a frame with crutches to hold them symmetrically; from this they should progress to parallel bars and afterwards practise unsupported in front of a mirror.

Correction.

7.—Finally, all those with poor abdominal tone, whether natural, or acquired after illness or operation, should practice several times a day some simple exercises to teach them control of the trunk muscles in the

attitude for walking; but the exercises should be done in a recumbent position first, and for a long time.

A set of exercises may be carried out as follows:—

Lying—diaphragmatic breathing, i. e. expanding ribs and abdomen together, then expiring with retraction of abdomen first and of ribs last.

Lying—slow, upward shrugging of shoulder which stretches lower ribs and tight lateral abdominal muscles.

Lying with one knee and hip flexed—slow raising of other leg with knee straight, foot inverted, and back flat; this is equivalent to correct walking step.

Lying—smart flexion of one knee and hip and opposite elbow; then sharp extension of the knee, and of arm above the head, so stretching hamstrings and pectorals simultaneously. The flexed hip prevents lordosis.

Standing with heels four inches from a wall, slowly flattening back against it from below upward, i. e. flattening out lumbar and cervical lordosis.

Abstracts

By John S. Coulter, M. D.

Sunlight and Health. Haven Emerson, M. D., F. A. P. H. A. (Life Member), Professor of Public Health Practice, Columbia University, New York, N. Y., Am. J. of Pub. Health, XXIII:5:437, May, 1933.

Excess of sunlight is known to cause two types of disturbance, physical lassitude, and nervous irritability, the former apparently due to the heat, the latter to the light radiations particularly. Insolation or "sunstroke" may be produced by excessive heat in the absence of sunlight.

Insufficient sunlight, which we can fairly assume need not, or does not, occur ordinarily in the tropics, but is common at part or all times of the year in temperate or polar regions, is responsible for only one clearly defined clinical entity, rickets.

Nothing is plainer in the morbidity and mortality experience of our northern cities than that the presence of rickets contributes heavily to sickness and death from bronchitis and pneumonia in young children, to lowered resistance to measles, whooping cough, and tuberculosis, and more remotely, by reason of pelvic deformities, to maternal deaths from difficult, instrumental, or operative deliveries. A further serious by-product of rickets is the disturbance of dentition, and a greater susceptibility to caries and malocclusion of the jaws. Spasmophilia is another condition closely related to rickets and due to insufficient sunlight for healthy infancy. It is to be remembered that rickets is a general metabolic disorder affecting other tissues than the growing ends of the bones, particularly the voluntary musculature and the blood.

There are psychological values in sunshine well recognized in the treatment of disease, and particularly in the management of chronic and convalescent patients, and it may fairly be assumed that the delight in the presence of sunlight, indoors and out, from infancy to old age, which is quite universal, is based on physiological benefits, whether they be because of warmth, dryness, ease of work, wider range of pleasures, range of color and form to delight the eye, or the feeding of euphoria that mankind gets from having his place in the sun. Sunlight assists in the healing of wounds on the surface of the body, relieves some of the pain of damaged tissues, and improves the bactericidal properties of the skin in and about the wound.

Studies have been made in an effort to support our physiological evidence of the benefit to health from sunlight, by proof of correlation between lack of sunlight and higher sickness and death rates. There are so many complicating economic, social, educational, and racial factors involved in comparing neighborhood or district death rates, on a basis of the amount of soot-fall, or on the quantitative presence of ultra-violet rays, that unequivocal evidence as sought has not yet been found, although the opinion is widely held that dark, smoky, foggy local atmospheres actually do cause a rise of local death rates. Certainly in London the presence of serious fog always causes a rise in deaths from respiratory, circulatory, and infectious diseases, and from accidents.

When the air is dirty or smoky, cleanliness and window ventilation are discouraged, light is reduced, plant life is damaged, spirits are depressed, and vitality is lowered.

Death Rates Per 100,000 Persons of Both Sexes, Age 10-19, Per Annum, From Organic Heart Disease, 1916-1921 Inclusive

Boston	7.03	Chicago	6.19
New York	5.42	Detroit	4.76
Philadelphia	5.38	Cleveland	4.42
Richmond	2.88	Cincinnati	3.55
Atlanta	1.92	Birmingham	1.67

I am privileged to add here the provisional results of a study of the death rate from organic heart disease (rheumatic carditis) occurring in the age decade 10 to 19 years, in cities in this country, according to latitude and smokiness of atmosphere from an unpublished report from the Department of Sanitary Science at the College of Physicians and Surgeons of Columbia University.

As one follows the coast cities south from Boston to Atlanta he finds a falling organic heart disease death rate in those 10 to 19 years of age, from 7.03 per 100,000 per annum in Boston, to 1.92 in Atlanta.

Similarly in following soft-coal cities of the country from Chicago south to Birmingham, one finds a fall in the rate from 6.19 in Chicago to 1.67 in Birmingham.

Many factors, and possibly fallacies, need consideration before accepting this as evidence that the changes in these death rates are related to climatic differences in ultra-violet radiations, which may cause differences in the virus of rheumatic fever or variations in the resistance of youth to this infection.

Fever Therapy and Other Recent Developments in Physical Therapy. By William H. Schmidt, M. D., in New England J. Med., 209:9:419, August 31, 1933.

Elevation of body temperature means elevation of the temperature of the blood stream, and it would seem that the results should be the same regardless of the method used. Any local concentration of heat is quickly equalized and nature tends to distribute it throughout the whole body. Therefore, that method which will elevate temperature safely and with the least discomfort to the patient will be preferred.

The technique varies with the method used but the object is to elevate the body temperature to the desired degree as quickly and safely as possible. Temperatures of 100° and 105° are used, but seldom above the latter degree. Whether the temperature will have to be sustained for any prolonged period still remains to be proved. Some workers have sustained the temperature

at 105 degrees for several hours, but our procedure has been to keep the patient well-wrapped in blankets and to allow the temperature gradually to fall to normal in three or four hours. We give the treatment five days a week for a series of ten treatments. We then allow the patient to rest for a month or two and if there has been any improvement we will then repeat the series.

Great care must be exercised in selecting the patients, as the treatment is rather strenuous and there is danger of fatalities. Advanced degeneration of the heart, kidneys or nervous system is a contraindication. Patients over 50 years of age are treated only when in perfect physical condition.

At the Jefferson Hospital, we have treated a number of cases of multiple sclerosis with some rather surprising results. We have found that those patients who have had remissions respond best, and that the earlier the treatment the better the results have been. Old chronic cases do not respond and advanced age of the patient warrants a poor prognosis. We have had a number of patients who have had complete remissions and others showing marked improvement. Sufficient time has not elapsed to enable us to call them cures, but many who have developed remissions, have not had a recurrence for as long as two years.

In paresis, a number of men have reported results equaling those results from the induction of malaria. In most instances, the temperature elevation has been sustained for several hours. We have had an opportunity to treat only a few cases, but our results, without attempting to maintain the temperature for a long period, have been equally good. We have seen complete restoration of mental and physical health in these cases, some of which gave little hope of improvement when the treatment started.

We have also treated a number of cases of post-encephalitis, showing the Parkinsonian syndrome, with marked improvement in quite a few. We also had a very interesting experience with one case of optic atrophy of the Leber type. This was a boy 19 years old, complaining of impaired vision for over a year, referred by Dr. Frank Murphy, chief ophthalmologist to St. Mary's Hospital, Philadelphia. Before treatment, vision was O. D. fingers at three feet. O. S. fingers at one foot. A large central, absolute scotoma in each eye. After several series of treatments, vision is now 6/6 in each eye. The central scotoma is relative in character and noted by patient only as a slight central haze. He can read a newspaper without difficulty at the present time.

Tabes dorsalis has also been treated with favorable results. Of course, it must be realized that you cannot replace nerve fibers that have been destroyed. The observations of Menninger and Fellows and others warrant further investigation of this disease.

Asthma and other allergic diseases have been treated by this method with a measure of success by Fineberg, Osborne and Afremow, Leopold and Stewart and Miller and Piness. Our personal experience has been limited, but I believe it is simply a matter of developing a correct technique, which will probably have to be modified to suit the individual patient and type of case.

A very great interest has been developed in the use of this method in the treatment of arthritis. This condition covers such a multitude of diseases, from so many different causes, that it will probably have to be treated by a varying technique, depending on the classification of the disease and its cause. There are sufficient data available to warrant a thorough investigation of this subject. Markson and Osborne have reported on the use of fever in this condition with favorable results, and no doubt, forthcoming reports will add much to our knowledge of how best to employ fever in the treatment of this now prevalent and disabling disease.

Another recent development in physical therapy is the use of histamine by cataphoresis in rheumatic conditions, muscular and nerve pains and all kinds of organic circulatory diseases. All external remedies having an anti-rheumatic effect produce redness of the skin with dilatation of the superficial capillaries, probably due to the formation of histamine. When histamine is applied cataphorically to the skin, there develops a dilatation of the superficial capillaries and of the larger, deeper-lying vessels, and an increased permeability of the vessel walls.

Deutsch reported a series of 250 cases including myalgias, sprains, sciatica, arthralgias, etc., with a large number of cures. Only those conditions associated with a localized sensitivity to pressure or inhibition to movement responded. Prompt relief was frequent and permanent results required from four to 20 treatments.

Trumpp reported a good percentage of results in muscular pains. Vas reported results in all kinds of circulatory diseases, including gangrene, furunculosis and inadvertent paravenous injections of medicaments. Bettmann recommends it for all circulatory disturbances whether functional or organic. He reports amazingly rapid healing in furunculosis, Raynaud's diseases and ulcers of the extremities. He considers it a specific for all acute myalgias and many cases of neuritis.

The application is made over the sensitive areas under the positive pole of the galvanic current by means of blotting paper, saturated with 1-1000 histamine solution. A current of five to ten ma. is used for one minute. A distinct redness results with the formation of a wheal. Another method for use in extremities is the partial bath with the histamine solution of 1-20000 strength for a period of ten minutes. Many cases have proved amenable to this therapy, especially organic circulatory diseases such as Raynaud's disease, early gangrene and trophic ulcer, etc.

A Brief Review of Fever Therapy in Neurosyphilis. Harry Beckman, M. D., Professor of Pharmacology, Marquette University, Milwaukee, in Arch. Dermat. & Syph., 28:3:310, Sept., 1933.

Diathermy, Electric Blanket, Hot Baths and Hot Air

Neymann and Osborne, Neymann and Koenig, Perkins and others reported on the successful treatment of dementia paralytica with diathermy. Apparently there are no contraindications to the employment of this method, except acute arthritic and pelvic infections and peptic ulcer with a tendency toward bleeding, and if these early reports are confirmed it will probably replace malaria therapy in institutions, since it seems to produce an even larger number of remissions, even among the repressive types that are much more resistant to malaria than the expansive patients. The successful treatment depends on certain mechanical factors necessary to produce and to maintain an elevation of temperature and to prevent burns. The prime requisites are properly constructed electrodes, and a machine powerful enough to give sufficient energy and proper insulation of the patient—things which obviously call for the services of an expert physical therapeutist. The technic is changing as the method develops, but Neymann and his associates, who have had probably the most extensive experience, gave from six to forty-nine treatments, the average being fifteen; they considered a temperature above 103.5 F. for at least five hours as optimal. Wilgus and Lurie assert that the electric blanket is the simplest and safest fever-producing agent, and they propose to substitute it for diathermy in

their future work at the Illinois State Psychopathic Institute. Mehrtens and Pouppirt employed hot baths, but gave up the method when they found that it was even more complicated than malaria treatment, as it required greater cooperation from the patient; the hot air method of Kahler and Knollmayer has the same disadvantage.

Summary

1. Among all methods of inducing fever in the treatment of dementia paralytica, the induction of tertian malaria by direct injection of blood from an infected person remains the method still most employed in institutions.
2. The use of quartan and subtertian (malignant) malarial infections is being experimented with successfully, especially the latter in persons who have not responded favorably to inoculation with the tertian parasite.
3. In England, the transmission of the various types of malaria by the bite of mosquitoes is being successfully accomplished, but the method necessitates special infecting laboratories for the mosquitoes, since induced malaria cannot be transmitted by the mosquito from one person with dementia paralytica to another with that condition.
4. Statistical compilations show that the patients' chance of a complete recovery through malaria therapy is about 20 per cent, but analysis of the figures indicates that for recently treated patients 30 per cent would perhaps be nearer the truth.
5. In tabes and in diffuse neurosyphilis, immediate and marked improvement (sometimes as far as complete symptomatic remission) is accomplished by malaria therapy; in individual reports such cases have made up from 40 to 60 per cent of the total cases in which treatment has been given. In late asymptomatic neurosyphilis, marked improvement in the spinal fluid is often brought about by malaria therapy, sometimes so far as complete reversal of the reaction to negative.
6. Relapsing fever and rat-bite fever are both inferior to malaria for inducing fever in persons with neurosyphilis.
7. The use of typhoid-paratyphoid vaccine for the production of fever through nonspecific protein effects is probably one of the two methods of choice for the fever treatment of neurosyphilis by the practitioner outside an institution.
8. The use of sulphur for the induction of fever is probably the second method of choice for such a practitioner.
9. Diathermy and related physical therapeutic methods of inducing fever are apparently very effective in the treatment of neurosyphilis and are replacing malaria therapy in selected institutions, but they will probably always be somewhat restricted in their usefulness because of the necessity of having trained physical therapeutists preside over the treatments at all times.

Treatment of Syphilis with Hyperpyrexia. Abst. in Jour. A. M. A., 100:21:1720, May 27, 1933, from Am. J. of Syphilis, St. Louis, 17:72, Jan., 1933.

Epstein and Paul treated a group of twenty-eight patients with various forms of syphilis of the central nervous system by means of hyperpyrexia produced by diathermy. They used a diathermy apparatus capable of elevating the body temperature to 41.1 C. (106 F.) They employed, with some modifications, the technic of Neymann and Osborne. Striking improvement was noted in thirteen patients with tabes dorsalis. The relief of pain was an outstanding feature. Improvement was noted in patients with other types of syphilis of the central nervous system, but this was not as marked as in the tabetic group. Serologic changes did not parallel the clinical improvement. One fatality occurred early in this work. The patient was a man, aged 67, with an extremely demented type of dementia paralytica. He was obviously a poor physical risk, but because of the rapid progress of his dementia his private physician felt the risk justifiable. Death followed the first treatment. His temperature rose to more than 106.8 F. In this patient a secondary rise in temperature occurred three hours after the current was shut off. His blood pressure was 220/0 five hours before death and 90/0 a few moments before.

The treatment of Chronic Multiple Arthritis. By George E. Anderson, M. D., Brooklyn, New York, in New York State J. Med., 33:17:1036, Sept. 1, 1933.

Types of Cases: Let us consider typical problems. We are presented with the obese plethoric female of the climacteric who complains of pain limited to the knees and objectively shows crepitating exostosed knee-joints without muscle atrophy or tendency to ankylosis—in addition weak feet and Heberden's nodes. Aside from her local disability, the patient has no complaints. In common terminology her disease is classified as "degenerative arthritis." She is a problem for both the orthopedist and the internist. The former's function is to build up the feet through support and selective exercises so that weight-bearing on the affected joint surfaces of the knee is equally distributed. The internist will also play a part in minimizing trauma to the knees and feet by reducing weight by rational diet which includes adequate protein, calcium and vitamine content but emphasizes low caloric ingestion. He must know whether this patient's cardiovascular system will make restriction hazardous and accordingly regulate carbohydrate. He will probably expose the patient to the generalized body massage for improvement of peripheral circulation. He may use desiccated thyroid to stir up a sluggish patient. Strange as it seems in this type of case, stock streptococcus vaccine subcutaneously at weekly intervals frequently helps these patients—probably through non-specific portein effect.

In contradistinction to this patient, let us visualize the true chronic atrophic arthritic—a sallow, frequently poorly nourished individual with rapid pulse, low blood pressure, cold clammy hands, fusiform finger-joints, cold dusky lower extremities, appearance of anemia usually out of proportion to its actual degree (because of unfilled peripheral capillary beds). This patient is ill and should obviously not be depleted by restricted diet but rather coddled as one would a tuberculosis case. Most dramatic is often the improvement of such a patient when a previous regimen of caloric, protein, or purin starvation is supplanted by a well-rounded-out adequate diet. Nor would one in such a patient be inclined to "rip out" even obvious focal infection without considerable reluctance.

Vaccines: Let us assume as is generally accepted and on good evidence that infection with the streptococcus in one of its many families is responsible for this patient's disease and that infection has entered through diseased tonsils as a portal. It is the practice in the Arthritis Clinic of The Brooklyn Hospital to treat such patients with a preliminary course of autogenous vaccine made from the tonsils in question—in accordance with the technique recommended by Dr. Reginald Burbank. On theoretical grounds, we search for other points which may harbor streptococci, especially stools,

gingivae, nasal passages, prostate, chronic discharging ears, gall-bladder bile. Streptococci found are incorporated into the vaccine, which is infected subcutaneously at weekly intervals. Initial doses are very minute, occasionally as low as 100,000 organisms increasing cautiously, aiming all the while to keep within the doses of tolerance as evidenced by absence of systemic reactions, falling blood pressure, or marked focal reactions in the joints. Recently we have used the intradermal route in view of the concept of the role of the reticulo-endothelial system in immunity reactions. We believe the latter route has definite advantages but are not prepared at this time to give relative statistics.

Allergy: Experimental work of others in relation to allergy in arthritis led us to skin-test our patients to their vaccines. The results were very disappointing. We inconsistently obtained positive skin-tests immediate or delayed. Recently, Doctors Arthur Lamb and Louis Nerb of The Brooklyn Hospital have been making observations on these same patients with bacterial filtrates —using some fourteen virulent strains of streptococci. Patients originally negative on skin-test to their own vaccine and who did not respond to vaccine therapy were skin-tested to the filtrate. A number of these showed strongly positive reactions both in skin and locally in joints. When treated intradermally by graded doses of the filtrate, not only did the skin-tests become less marked but joint symptoms improved. Encouraged by their findings, they have been applying autogenous filtrates in a similar manner. We hope for larger favorable response than to autogenous vaccine, which in our experience is extremely limited in its application. The filtrate should present a more effective therapy by desensitizing the patient to the bacterial products rather than to the organisms themselves.

General Treatment: Whatever be the argument for or against vaccine and filtrates, we may not forget that the host is a patient with a general systemic disease of which the joints are but one manifestation. Failure to consider secondary anemia, low blood pressure, malnutrition, faulty bowel function, and the mental depressive state so characteristic of most of these sufferers, may preclude satisfactory results. When possible, systematic general body massage should be practised for its tonic effect on peripheral circulation. Contrast baths to hands and legs are helpful—the glove bath which I have recently seen described gives symptomatic relief to painful finger-joints. Elaborate physiotherapeutic apparatus is rarely necessary. It may be interesting to note here that the use of diathermia in our group was disappointing.

It is unwise to keep these patients in bed for any length of time, a week or two being the maximum during any acute exacerbation. Time spent in explaining the necessity for maintaining straight knee-joints by avoiding pillows under the knees may mean the difference between an ambulatory and a chair-ridden future (in atrophic cases).

Muscle atrophy in this disease should be vigorously fought by massage and judicious exercise. In this connection, of considerable help is the "walking chair," whereby a patient may make use of thigh and leg muscles to get about, at the same time obviating the trauma of body-weight on pathological knee-joints.

Sunshine and Irradiated Milk Therapy to Reduce High Incidence of Rickets. By Esther B. Hardisty, B. A., C. P. H., New York, in Arch. Pediat., L:8:549, August, 1933.

In considering the exceedingly high incidence of rickets, as evidenced by the statements given in this paper, and the data reported as to hours of sunshine in different parts of the world, as well as the recognized efficacy of sunlight in the prevention of this disorder, one can readily see that "all the sunlight in the world will not suffice to construct a calcareous bone in the absence of the elements that constitute its organic ingredients." In other words, the diet must be so selected as to meet the needs for growth and normal development and must include the "accessory food factors" (the vitamins) in sufficient quantity and potency to insure normalcy and therefore protection against the deficiency diseases.

With the discovery of Hess and Steenbock, independently and almost simultaneously, in 1924, that various foods could be activated by ultraviolet ray and thereby made antirachitic in power, a new force was brought to bear in the fight against rickets. For many years cod liver oil was considered the most effective weapon against rickets; it was the most widely used and medical literature is replete with references to its use and effectiveness. However, again a scrutiny of the universality of rickets as a communal and individual disorder goes far in showing that this therapy has not met the needs of the situation.

This failure of cod liver oil therapy in the prevention and cure of rickets may be due, in part, to its disagreeable taste and odor, fat intolerance, or inability or inaccuracy on the part of those caring for infants and children to administer this added antirachitic agent.

Hess and his co-workers give a very clear statement regarding their experience relative to the use of cod liver oil: "For many years cod liver oil was the most popular remedy, even before its efficacy had been clearly proved or definitely accepted. After a test of many years it would seem that its disagreeable taste and odor precludes its universal adoption; the fact that mothers dislike to give it to their infants precludes its general application. This winter we found that a large number of mothers attending the clinics did not give their infants cod liver oil although repeatedly urged to do so by the physicians and nurses in charge and, furthermore, that only five were giving the requisite dose of three teaspoonfuls (15 gm.) a day; many gave only ten drops or half a teaspoonful daily. Another drawback and partial disqualification attached to many of the antirachitic remedies is their expense, a disadvantage which is all the more important during times of economic stress. The main disadvantage attached to these therapeutic measures is, however, that they depend necessarily on the cooperation and good will of the mother and are not automatic in action."

Conclusions

Sunshine of itself, due to the effect of moisture, smoke and dust in the atmosphere, goes far in circumscribing the value of this means of prophylaxis against rickets. "The dominant factor in regard to the antirachitic activity of the solar ray is not so much the number of hours of sunshine as its quality and intensity."

Although human milk has been thought to be more potent in antirachitic therapy, clinical evidence does not bear out the truth of this conclusion. The diet of the mother determines to a marked extent the protective potency of her milk.

The place that has been allotted to irradiated milk in the fight against rickets has been well proven, both clinically and experimentally. The fact that it is automatic in action and that the antirachitic factor is embodied in the food of the infant insures ingestion of sufficient vitamin D for protection against rickets.

The widespread interest, along with the multiplicity of articles dealing with the use of irradiated milk, both fluid and dry, in the prevention and cure of rickets, bids fair

to make it of interest to all public health workers as well as members of the medical profession. The American Journal of Public Health says: "—there are two reasons why an activated milk should be singled out for prophylactic use; first and mainly because it provides a therapeutic measure which is automatic, in that the specific agent is embodied in the food which is essential for the nutrition of the infant."

Diseases of Bones and Joints, Procedures in Physical Therapy. By Jerome Weiss, M.D., Brooklyn, New York, in New York State J. Med., 33:17:1034, September 1, 1933.

Physical therapy in the treatment of diseases of the bones and joints is not new, in fact it probably preceded all other methods of treatment. Exposure of an ailing member to the sun, steeping it in hot or cold water, manipulation of a stiffening joint,—just to mention a few of our "modern" methods which have came down from antiquity.

In medicine we have altogether too few true specific treatments. In the treatment of tuberculosis of the bones and joints we find a true specific in ultra-violet light. The work of Rollier at Leysin has left no question of the efficacy of the treatment. In rickets ultra-violet light is also a specific either applied directly to the body or obtained second-hand through natural or artificial sources of vitamin D. Many other conditions of the osseous structure respond well to ultraviolet therapy, but specific action is not noted.

Diathermy is another valuable remedial agent which has been developed in recent years. It is particularly adapted to treatment of the bones and joints, but here the method of application and consideration of the indications are of the greatest importance. The response of a Neisserian joint infection to diathermy treatment is, in the opinion of many, another instance of rare specific action. The acute gonorrheal joint is extremely tender, and application of electrodes is difficult. Development of short wave technique, which requires no application of electrodes, may in the future obviate this difficulty. With our present equipment, experience has taught several novel methods of application, particularly the use of saline tubs, which make the treatment possible and effective.

In order to treat any part with diathermy the bulk of the current must pass through the area desired. Failure to accomplish this will give but poor result, which will usually be ascribed to the modality rather than to its application. The after-treatment of fractures with diathermy is familiar to all, and its value is now conceded. In the injured joint with limited motion not due to bone block we can expect much benefit from the use of diathermy. Correct and gentle application of the treatment will quickly dispose of extravasated blood and lessen thickening of the joint capsule which otherwise so often occurs. In these cases the decongestive action of the static effluve and induced sparks will also be of value.

Baking and massage have been extensively used in arthritic and other conditions, too often for want of any better mode of treatment. The results are seldom those desired. Despite the extensive use of massage and the great number of operators who apply it, there are few who ever acquire the necessary degree of skill to correctly treat all cases which may be encountered. Were this not true we could expect far better results than are usually obtained.

Cataphoresis or ionization is another modality worthy of mention which has had its phases of popularity and dispute. The possibilities of the treatment are attractive, but a clear conception of its application and limitations is essential if any benefits are to be expected. The majority of the active substances used in cataphoresis treatment to the joints are anions, which necessitates their application to the negative pole as the active one. It is under the negative pole, the alkali former, that galvanic burns are most likely to occur. Moreover, these are particularly likely to occur when a pad of moistened lint is used rather than immersion of the part in a solution of the desired material. Thus we can readily see that for the best application of cataphoresis we are limited to the distal portion of the extremities, which are easily treated by immersion in the solution. Cases of chronic arthritis of the fingers and toes, and metatarsalgias, so often resistant to medication and other forms of treatment frequently respond in a most gratifying manner to the use of sodium salicylate by cataphoresis.

Manipulation of a diseased bone or joint must be carried out with the greatest caution. Pathological fractures have resulted from the slightest stress applied where rest was indicated. In the stiffened joint following injury or disease a gratifying immediate result can be obtained by forcible manipulation under anesthesia. But too often the period of improvement is brief. In breaking up of the organized tissues hemorrhage has occurred, much blood is extravasated, and more massive organization than before is the result. In many of these cases persistent use of diathermy would produce far better end results without any manipulation whatever.

Traumatic Synovitis. Norman Edwin Titus, M.D., New York, in Arch. Physical Therapy, XIV:5:285, May, 1933.

Traumatic synovitis of the knee with effusion is a condition frequently seen in general practice. Treatment by average methods is usually long drawn out and attended by chronic changes difficult to control. In order to prevent the resulting invalidism a study of 290 cases was made with results cited below.

Heat Therapy

It is thoroughly understood today that serious effusions in joints are dissipated from the joint cavity by means of the lymphatics and not by the circulation. Therefore one can not expect great clinical results from the use of diathermy, although symptomatic relief is a rather consistent occurrence. The role of physical therapy in the treatment of this condition is to exert such forceful mechanical influences upon the part as will be effective in forcing the effusion into the lymphatics. A little heat applied to the joint is frequently sufficient to prepare it for the mechanical treatment about to be instituted. Diathermy treatments of long duration are not advantageous. The application of a heat lamp on both sides of the knee can cause sufficient vasodilatation in this region and that is all that the heat is supposed to do.

Massage and Exercise

Very effective results can be obtained by massage. Particular attention should be given to massage above the knee and up the thigh, because it is necessary to remember that the valves in the lymphatics can stop whatever lymph is removed from any part from returning thereto.

Static Current

Practical experience has shown that the best treatment for effusions in the knee joint is by the static current. The obvious decongesting action of this high voltage current brings about a visible diminution of extravasated fluid in soft tissues. This action is so constant that it is the routine procedure at Presbyterian Hospital. All

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cases of joint dislocations are treated with the static brush discharge before reduction and immediately after. It is therefore natural to expect that the same action of the static current can be invoked on increased synovial fluid. Clinical experience bears out this fact, and in a large number of acute cases of synovitis with effusion, it is now possible to say with assurance that the fluid can be entirely removed in three or four treatments.

Experience has also shown that between treatments it is not necessary to completely immobilize the joint with plaster or splints. A figure of eight application of an Ace bandage is sufficient to support the patella and gives the patient adequate flexion to be able to walk with a crutch or cane.

Advances in the Diagnosis and Treatment of Thrombo-Angiitis Obliterans. By Samuel Perlow, M.D., of Chicago, Illinois, from the Peripheral Circulatory Clinic of the Michael Reese Hospital, in Ann. Surg., XCVIII: 1:43, July, 1933.

Bed rest and heat to the extremity are among the simplest and most effective methods used to promote the formation of a collateral circulation. The period of rest should be from three to six weeks or more and should be accompanied by the application of dry heat for two hours several times daily. Diathermy and quartz-light treatment have their indication—the former to warm the extremity and by the relief of vascular spasm and vaso-dilatation to aid in the formation of a collateral circulation, and the latter to stimulate healing of superficial, slowly healing ulcers.

Buerger devised a set of exercises which have been found to stimulate considerably the reestablishment of circulation. With the patient lying on his back the extremity is elevated 60° to 90° above horizontal for the minimum time required to produce ischaemia (thirty seconds to three minutes). It is then allowed to hang down until one minute after the appearance of the reactionary rubor (two minutes to five minutes). The extremity is then held in the horizontal position for three to five minutes, during which time dry heat in the form of a therapeutic lamp is applied. This cycle is repeated for one hour every alternating hour of the day.

Contrast foot baths aid greatly in the formation of a collateral circulation by means of the alternate contraction and dilatation of the vessels. The baths consist in alternately immersing the extremity for one-half to one minute in cold water at 40° to 50° F. and warm water at 100° to 110° F. This should be continued for fifteen to thirty minutes several times daily and may follow the exercises described before.

Treatment of Pain in Chronic Arthritis. Daniel E. Kauffman, M.D., St. Louis, in J. Missouri M.A., 30:7: 273, July, 1933.

For the relief of pain four measures are used: (1) Bed rest; (2) diet; (3) contrast baths; (4) medicine.

Bed Rest.—Bed rest for arthritis should be as emphatic and as strictly carried out as it would be for an acutely sick person. Patients should not be allowed to go to the toilet. Quietness is very important. In atrophic cases passive motion should be done gently several times a day.

Diet.—There are two main diets which are used in arthritis; namely, the low carbohydrate diet advocated by Pemberton, and the reduction diet, in cases of traumatic arthritis due to obesity. The value of Pemberton's work on diet is easily appreciated by any one who treats many cases of arthritis. In many cases it, in itself, is capable of remarkable results.

It is my routine to put a patient on a restricted diet varying from one thousand to fifteen hundred calories, at the beginning of the treatment. This restriction should last only as long as the pain is present. Practically all the patients with the atrophic type are undernourished and as soon as possible should be placed on a building up diet.

The cases of hypertrophic arthritis due to obesity require the same reduction diet that would be used in any case of overweight.

Too great emphasis cannot be laid on the importance of losing weight in patients where obesity is a factor. In cases where the knee, ankles, or hips are involved the reduction of weight lessens the insult to the joint. The burden is that much less to carry.

Contrast Baths.—This is the most important form of hydrotherapy for the alleviation of pain in chronic arthritis. Its results surpass those of any kind of physiotherapy. Because of its simplicity it is often hard to impress on the patient the necessity of doing it regularly.

The only apparatus needed is a pan of hot water, a pan of ice water and two bath towels. The hot towel is wrapped around the painful joint and allowed to remain for about thirty seconds. Then the ice towel is applied in the same manner. This is repeated for twenty minutes and should be done two or three times a day. If the involvement is in the hands, they are simply immersed in the pans alternately. If the feet are the site of pain, deep pans or buckets should be used to insure covering above the ankle joint.

Medicine.—The drugs used for the relief of pain in chronic arthritis are, (a) sodium salicylate, (b) acetyl-salicylic acid and (c) codeine.

Importance of Posture in Health. B. M. Canter, New York, in M. J. & Rec., CXXXVII:12:483, June 21, 1933.

Posture exerts a great influence on health. The individual owes it to himself to stand erect in order to feel physically fit.

Backache

Common everyday complaints are fatigue, backache, footstrain and joint pains. From the postural viewpoint, it is frequent in those who stand with the lumbar spine hyperextended, causing irritation of the spinous processes. Pain in the lumbar region occurs for the most part in the obese, thickset individual who has less back movement than the counterpart of this type. It is surprising how many persons of the sacroiliac type obtain relief by correction of their bad habits. The obscure cases of bursitis about the shoulder joint and neuritis of the arms are sequelae of poor posture and I have seen patients run the gamut of therapy before the condition yielded to correction of the static difficulties.

Weak Foot

The weight of the body is, in normal subject, transferred through the tibia to the astragalus, os calcis and anterior part of the foot, passing from the midline of the thigh, through midline of the knee, bisecting the foot on the line with the second toe. In this class of strain the lines of force pass inside of the foot, throwing added burden on the muscles on the inner side of the foot, which helps to maintain the long arch. The well known sequelae of events follows: the inverting muscles tire, the ligaments are stretched, there is swelling, the foot is distorted, and rotated outward; backache is often complained of as a result of the strain imposed on the erectospinae muscles by simple walking with the feet everted.

Arthritis

Next in the list of common results from bad posture is arthritis. As a clinical entity arthritis embraces every department of medicine and surgery.

Arthritis of the knee is an outstanding entity. In the group of the obese with the protuberant and sagging abdomen, an increased load and strain are imposed on the knee causing the irritative type of arthritis, which around middle life forms that class known as hypertrophic arthritis with poor body mechanics, the lines of force playing upon the inner aspect of the knee causing contact and irritation of the joint surfaces and arthritis inevitably results. Many cases of this type have been relieved when treated early, by instruction in maintaining good posture.

The neck muscles are over-burdened, as in desk workers who suffer from fatigue due to constantly holding the head too far forward, bringing it out of balance. Here the condition is corrected by rest at intervals and change in position. This should give tremendous relief by changing the body mechanics, thus the symptom of backache and fatigue will be less frequent.

Postoperative Thrombophlebitis of Lower Extremities. A. Aldridge Matthews, M.D., F.A.C.S., Spokane, Washington, in Western J. of Surg., Obstet. & Gynec., 41:6: 318, June, 1933.

As a preventive we should aim to keep up a good circulation in the extremities. Getting the patient up early does not always prevent thrombosis. Bed gymnastics should be carried out diligently when possible. Payr pictures his method of suspending a round block of wood (like a slender tree trunk) horizontally against the foot of the bed for the patient to roll with the soles of the feet. The usual bed gymnastics and stretching the feet are also practiced. The methods laid down by Pool are very good, and can be carried out by the patient with no special discomfort.

Respiratory exercises are very important as soon as possible after operation, encouraging the patient to take deep breaths frequently. It has been my habit to have my patients, after anesthesia, inhale carbon dioxide for the last few minutes before leaving the table, to stimulate deep breathing.

Some European operators have recommended that if an extensive abdominal operation is to be performed, and varicose veins are present, the veins should have attention first, or at least the saphenous veins on both sides should be ligated before operation upon the abdomen.

Before a clot has formed, measures to prevent venous stasis are in order, but after formation of the clot, it is well to keep the leg flat on the bed and the patient in a sitting position. This encourages thrombosis, but lessens the flow of blood to the heart, and possibly lessens dislodgment of the clot. After one feels that the thrombus is well attached to the vessel wall, elevation of the leg is recommended with continuous dry heat, which is preferable to moist heat or cold. The ligation of the vein is recommended by some, after thrombosis has occurred, and has been quite successfully carried out. Although I have never resorted to it, I believe where there are evidences of emboli being washed off, it should be done.

There is no objection to beginning the leg exercises about a week after all inflammatory activity ceases. The leg should be kept up, and never allowed to swell to any great extent by being dependent. Usually, one can prophesy by the rapidity with which the swelling disappears as to the permanency of the damage. After an operation, supports in the form of bandages or elastic stockings are not necessary as a rule. The latter is the better, if desired.

Conclusions

1. The specific cause of thrombophlebitis is not definitely known.

2. Causative factors are trauma, infection and its consequences, dehydration, slowing of the blood stream, pathology of the vessel wall, and disturbance in the composition of the blood, or a combination of the above mentioned factors.

3. Prophylaxis: Avoid trauma and infection, keep the patient well supplied with fluids by one or more of the various methods of administration. Use thyroid to whip up the heart, thereby increasing the blood flow and metabolism. When the clotting time of the blood is increased, the use of sodium thiosulphate intravenously may be advisable. Following an abdominal operation, encourage bed exercises, as recommended by Payr or Pool.

Injuries of the Semilunar Cartilage: Effective Treatment of Recent Injuries and of Some Recurrent Types. By C. Stewart Wright, M.B., Toronto, in Canad. M.A.J., XXVIII:6:618, June, 1933.

To summarize, then, the treatment of an injured lateral ligament with displaced or injured cartilage or a severe injury of the lateral ligament alone is:

1. Reduction. This is usually accomplished by nearly full flexion, internal rotation of the tibia, and extension, preferably under an anaesthetic. The only definite indication of complete reduction is a knee that can be completely extended without force, or even affords the sensation of slight hyperextension.

2. Injection of five to ten minims of tincture of iodine at the point of greatest tenderness, and deep enough to reach the tibial border, to create an aseptic inflammatory reaction sufficient to aid the cartilage to adhere.

3. Fixation in extended position by a light plaster with only stockinette or single bandage lining, and a piece of silence cloth over the knee and the prominence of the head of the fibula. This is kept on two weeks.

4. After one, or at most two days' rest, permit function by walking, i.e., weight-bearing. This function in the extended position maintains the cartilage in a position to unite, but at the same time prevents the development of stiffness, which is the usual result of fixation with complete rest.

5. Muscle redevelopment. This might be considered a refinement of the treatment, as if the first four principles are carried out recovery will usually be effected. It is, however, most important to re-establish muscle tone as early as possible, and I consider this part of the treatment a most important guarantee against an accident or recurrence through a lack of muscle response in any sudden or unexpected stress on the joint. There is no part of the treatment more important as a guarantee against recurrence. The best effect is obtained by faradic stimulation, massage, and active exercises.

6. Prevention of mechanical stress by elevation of the heel of the shoe on the inner border for internal cartilages. Usually one-quarter to three-eighths of an inch wedge is sufficient. An exception to this procedure. In very acute primary injuries swelling may be so tense and pain so severe as to make the early fixation in plaster inadvisable, in which case extension should be preserved by a posterior splint and rest, and if the swelling is very great and the pain acute aspiration is advisable and will give great relief.

In the past eight years 33 patients have had treatment in this manner. Five cases only were primary injuries, 4 with a history of locking. None are known to have recurrence, though 2 were lost track of after six months. Two cases are satisfactory after two years and one for one year. Of 28 recurrent cases, one, a case that gave trouble almost regularly every few weeks on the least provocation, for a period of two years, was followed for three years after treatment without any recurrence and,

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so far as I know, has stayed well. This was one of the first cases injected, and was treated in this manner only because for various reasons consent to an operation could not be obtained.

Tenosynovitis and Myositis. Queries and Minor Notes, Jour. A.M.A., 101:4:304, July 22, 1933.

To the Editor.—A man, aged 27, has had a sensation of friction on flexing certain muscles for the past four years. It started in both knees and next involved the right elbow, then the left elbow and now is present in all those joints and also the left shoulder. On palpation, flexion and extension with the antagonistic muscles tensed gives a sensation of crepitus and the creaking can be heard. There has been no swelling or any other evidence of inflammation in either the muscles or the joints. He had gonorrheal urethritis, six years ago, which was treated and apparently cured. He shows urticarial lesions irregularly placed on the arms and trunk. He works as a rancher. Any information on the cause and treatment of this condition would be appreciated. Please omit name. M. D., South Dakota.

Answer.—This case may be classified as multiple tenosynovitis, possibly in a group called occupational synovitis. There may be an element of multiple myositis, which is analogous to such conditions as rider's knee, soldier's shoulder, fencer's bone and dancer's bone. Other conditions that come to mind are interstitial calcinosis, arthritis, myositis, synovitis, myositis ossificans, myositis ossificans para-arthritica and occupational tenosynovitis due to repeated injuries.

Many of these cases follow infectious disease and are not of traumatic origin. This patient may be developing a generalized calcinosis or generalized tenosynovitis. There may be an element of myofascitis or fibrositis ossificans progressiva.

These various conditions are caused by infection and trauma. Trauma may be one severe blow or multiple minimal strains or sprains. The occupation of a rancher may account for these.

The tendon in a tendon sheath may be compared to an umbrella in an umbrella cover. If there is no free play of a tendon in its sheath, palpable and audible crepitus may be noted when the tendon is active. There may be a dry tenosynovitis.

In the treatment, the first consideration is rest. This may necessitate a change of occupation. The patient should note those activities which cause crepitus and discomfort, and avoid them, just as one should avoid those foods which are known to cause gastric or intestinal disturbances. The application of a plaster-of-paris cast for a few days would make a good test of whether this form of treatment is applicable in this case. Later a removable splint should be tried. This splint should be removed twice daily for radiant heat and diathermy. Massage should be very cautiously tried. Its continued use depends on the response.

Postpartum Exercises. Queries and Minor Notes, Jour. A.M.A., 101:4:304, July 22, 1933.

To the Editor:—As there appears to be a marked difference of opinion with regard to the benefits of postpartum exercises, will you give me a routine for the normal puerperium? Kindly Omit name.

M. D. Michigan.

Answer.—Beginning on the second day after delivery, patients should be placed in the Fowler position part of the day. In addition, they should lie on the abdomen for about fifteen to twenty minutes three or four times a day. These changes in posture help to maintain the downward drainage of the lochia and keep the vagina free of lochia, thereby diminishing the chances of infection that may result when the cervix lies buried in a pool of debris and bacteria. On the third or fourth day of the puerperium, patients may have a light general massage of the entire body except the abdomen and the breasts. This is passive exercise. Two days later, systematic exercises involving the arms, legs and abdomen are begun and carried out while the patient is in bed. These exercises improve the circulation, strengthen the tone of the abdominal muscles and hasten the patient's general recovery. The following exercises are recommended: The pillows are entirely removed or one pillow is placed under the patient's back. A series of deep breaths is taken. During inspiration the arms, which lie at the sides, are slowly raised either above the head or upward toward the ceiling. On expiration the arms are slowly returned to their original position. Then the head is raised and lowered a number of times, and following this the extended legs are elevated and lowered one at a time and later the two at the same time. This is followed by flexion of both the thigh and the knee of each leg and then of the two legs together. Next the flexed thighs are abducted a number of times. Then the patient assumes a sitting position with the arms extended along the sides of the body and, if the patient is able, she should repeat this exercise with the hands behind her head. This is followed by the knee-chest position, which should be properly carried out and maintained for gradually increasing periods beginning with a five minute period. After the third week the patient may be instructed to perform the "monkey trot," that is, walk fast on both hands and feet a number of times a day, or she may be asked to practice the "mule kick." In all cases the exercises should consume only a few minutes at the start, and each day the time should be increased, depending on the patient's general feeling and her endurance. If the exercises increase or bring about a return of red lochia, they should be stopped for a few days.

Chronic Arthritis of Knee. Abst. in Jour. A.M.A., 101:2:171, July 8, 1933, from Missouri State Med. Assn. J., St. Louis, 30:125 March, 1933.

Kauffmann points out that the treatment of arthritis of the knee is no different from that of arthritis of any oher joint. The salicylates are the most important drugs used. Because of the small amount that can be administered by mouth or intravenously, he uses neither of these two methods; he prefers giving the drug by rectum. The advantage is that mammoth doses can be taken without gastric upset. On the first day he gives from 100 to 150 grains (6.5 to 9.7 Gm.) in 4 ounces (120 cc.) of water by rectal drip, followed by an enema during the morning and evening. On the second day he gives two doses of from 150 to 200 grains (9.7 to 13 Gm.). On the following days he gives from 200 to 250 grains (13 to 16.2 Gm.) twice daily in 6 ounces (180 cc.) of water. The amount of the drug will depend on the condition of the patient. This form of treatment is especially useful in acute rheumatic fever and when the pain is severe. At the Mayo Clinic the rectal method is used, the salicylates being injected in a paste. The most important form of hydrotherapy in arthritis of the knee is the contrast baths, for which a pan of hot water and one of ice water and two bath towels constitute the apparatus needed. The hot towel is wrapped around the painful joint for one minute, and then the ice towel is applied for the same length of time. This

is continued for twenty minutes and is done twice daily. Two types of vaccines are used in the treatment of arthritis, the specific and the nonspecific. The use of the former presupposes a correct bacteriologic diagnosis. This consists of taking cultures of material from a supposed focus in the patient's whole blood under the supposition that only the pathogenic bacteria will grow, there being enough resistance in the blood to inhibit the growth of the saprophytic organisms. The most successful form of nonspecific vaccine is the typhoid, and the triple typhoid vaccine is most commonly employed. The initial dose is 25,000,000 intravenously. In patients aged more than 50 it is best to begin with the smaller doses, ten or fifteen million. The second injection is twice the size of the first, and to each following one is added the amount of the original dose. One must naturally be guided by the severity of the reaction. The treatments are given twice weekly for six treatments. If there is no rise in temperature following the fourth injection, it is useless to continue. If improvement has been noted at the end of the series, it is best to wait several weeks and start a new series, this time beginning with the amount that will cause a mild reaction. Because of the reactions that follow, these patients should be kept in bed or, better, in the hospital.

Exercises for Spastic Paralysis Due to Cerebral Hemorrhage in Child. Queries and Minor Notes, Jour. A.M.A., 101:2:160, July 8, 1933.

To the Editor:—Please recommend appropriate exercises for a boy, aged 4½ years, with a residual spastic paralysis of both legs and the right arm, following hemorrhagic cerebral injury at birth. The gait is spastic with relatively little tendency to scissoring. The feet are inverted and rotated in. The heels come down well and there is no flexion deformity of the knees. Sphincter control is good. What may be expected of a Stoffel operation in this case and what would be the optimal age? Would this operation eliminate the remains of the scissoring?

J. E. Reeves, M.D., Norfolk, Va.

Answer—Appropriate exercises must be outlined to fulfill the requirements of the individual case. A standardized group of exercises cannot be applied to spastic paralysis. It is necessary to examine the muscular action of each joint in order to ascertain the strong or dominant groups from their antagonists. The exercises are then outlined to increase the power of the antagonists and thereby lessen the power of the deforming groups.

Exercises should consist of individual muscle contractions and group muscle contractions both in and out of water. For the types of exercises applicable to the various joints and for a method of muscle examination, the correspondent is referred to the chapter on Muscle Training in Jones and Lovett's Textbook of Orthopaedic Surgery, New York, William Wood & Co. In a monograph by Dr. Loyal Davis in volume 2 of the Principles and Practice of Physical Therapy, published by Prior and Company, the following references are given:

Franz, S. I.; Sheetz, Mildred E., and Wilson, Anita A.; The Possibility of Recovery of Motor Function in Long-Standing Hemiplegia, THE JOURNAL, Dec. 18, 1915, p. 2150.

Crothers, Bronson: Birth Injuries of the Central Nervous System, in Medicine Monographs, volume 2, Baltimore, Williams and Wilkins Company, 1927.

Frankel, H. S.: The Treatment of Tabetic Ataxia by Means of Systematic Exercise, English edition translated and edited by L. Freyherger, Philadelphia, 1902.

The most important phase of spastic therapy is exercises. If contractures or deformities are present, the exercises will be of no avail because of these hurdles. It will be necessary to correct these contractures and deformities to permit proper exercising. The Stoffel operation is one of the means of overcoming these obstacles.

The most suitable age is 5 or 6 years, because the child will be old enough to cooperate in the performance of the exercises, which cooperation is so valuable as a postoperative measure. The Stoffel operation will eliminate the remains of scissoring only if the scissoring is caused by spasticity of the abductor muscles of the hips. If it is caused by contracture of these muscles, it will be necessary to do myotomies at the same time.

Inconveniences Due to Electrotherapeutic Apparatus. Section of Foreign Letters, Jour. A.M.A., 101:3:222, July 15, 1933.

The installation of an electrotherapeutic cabinet in a building in which there are several renters, as often happens in large cities, may expose the practioner to formal complaints lodged against him in the courts, by his neighbors. In several instances, neighbors have contended that rays emanating from radiologic apparatus passed through the walls and caused various disorders. The courts ordered inquiries made and then required the radiologists to enclose their cabinets in a booth with thick walls covered with sheets of lead. Now the devotees of wireless telephony complain that high frequency apparatus emits waves that disturb their radiotelephonic transmissions. At Amiens, a dealer in apparatus used in wireless telegraphy brought suit against a physician, alleging that, in giving diathermic treatments, he disturbed the wireless apparatus that he displayed to customers. Similar observations have been made about the electric plants located in the center of cities. These plants, however, are too important to close down to suit the pleasure of listeners-in on the radio. Greater severity, however, is being shown, as usual, toward the physicians, and the court of Amiens ordered the electrotherapeutist to take such action as was necessary to prevent the business of the dealer in wireless apparatus from being disturbed. The physician found it next to impossible to prevent such disturbance, so he was ordered to change his consultation hours.

An Appraisal of Antirachitics in Terms of Rat and Clinical Units. Alfred F. Hess, M.D., and J. M. Lewis, M.D., New York, in Jour. A.M.A., 101:3:181, July 15, 1933.

Conclusions

A further clinical test was carried out on irradiated milk, "yeast milk," cod liver oil and viosterol, the study being controlled with bio-assays of the various antirachitic preparations. It was found that the antirachitic milks, especially irradiated milk, require a surprisingly small number of rat units (from 35 to 40 daily) to confer protection or effect healing, and that viosterol requires the largest number.

Irradiated milk seems to be the most desirable antirachitic for prevention on a communal scale. Only 20 to 24 ounces daily is needed to assure protection. This therapeutic agent has the advantage of being automatic

and inexpensive and of providing calcium and phosphorus as well as the antirachitic factor.

The marked distinction between clinical units and rat units implies that the present method of rating antirachitic agents is misleading. Their respective biologic potencies, as expressed in rat units, are not interchangeable. Each type must be appraised for itself. Its minimal number of therapeutic units must be ascertained clinically and then expressed in terms of rat units. The wide differences in activity between various antirachitics indicate that a clinical as well as a laboratory pharmacology must be taken into account.

Diathermy in the Treatment of Chronic Deafness. Abst. in Jour. A.M.A., 100:24:1968, June 17, 1933, from New Jersey Med. Soc. Jour., Orange, 30:130 February, 1933.

Yazujian treated four patients suffering from advanced catarrhal deafness and one from moderate nerve deafness, perhaps a sequel of erysipelas. All obtained satisfactory hearing from this treatment. He has also used diathermy in ordinary chronic conditions, combining it with the routine treatment, and believes that it expedites the recovery of hearing. The patient should be seated in a comfortable chair and assured that there will be no pain, shock or any discomfort during the treatment. An 8 per cent solution of cocaine should be applied once to the nasal mucous membrane as far as the posterior choana. While the cocaine is taking effect, cotton should be wound on the triangular ends of the nose and ear electrodes so as to form a cylinder, and care should be taken that the points of the electrodes are well covered to a thickness of about 25 per cent more than their insulation. The cotton-covered electrode tips are then dipped in physiologic solution of sodium chloride, the excess fluid being gently squeezed out. The ear electrodes are placed in their holders and the operator, stretching apart the two ends of the head band which holds the ear pieces, introduces a tip into each meatus and brings the holders in alinement with the meatal passages horizontally. The latter are then gently pushed in toward the drums two thirds of the depth of the canals, but under no circumstances allowed to touch the drums. Next, the nasal electrodes are introduced in contact with the floor of the nose until the posterior pharyngeal wall is reached. Over the outside ends of the aural and nasal electrodes are slipped the tubal ends of their respective cords. The dials on the current reducer are set at maximum and then one of the gaps of the diathermy machine is opened slowly until the spark is just visible. In a few seconds the patient will begin to feel heat in the ears. It should be explained that gentle heat is desired and that, if the heat becomes intense, he must immediately tell the operator. If one ear feels too hot, the reducer on that side should be retarded; if both ears get too hot, the gap should be narrowed. While the current required is from 30 to 60 milliamperes, meters should not be depended on because only a few are sensitive enough to record such a small current correctly. The treatment lasts from fifteen to twenty minutes with the patient feeling comfortably warm in the ears. Immediately following diathermy treatment, pneumatic massage may be given.

Diathermy. A Preliminary Statement to Acceptance of Diathermy Apparatus. Council on Physical Therapy in Jour. A.M.A., 100:24:1933, (June 17, 1933).

Diathermy is the therapeutic use of a high-frequency electric current to generate heat within some part of the body. The current employed is greater in frequency than the maximum frequency for neuromuscular response and ranges from several hundred thousand to millions of cycles per second. The spark gap diathermy and the vacuum tube oscillator are the two general types of units manufactured. For the physical characteristics of high frequency currents see the Handbook of Physical Therapy, page 382.

For want of better terminology, diathermy may be divided into two divisions: medical diathermy and surgical diathermy. The term "surgical diathermy" appears to be becoming obsolete and the term "electrosurgery" is taking its place.

Medical diathermy is the production of heat for therapeutic purposes in body tissues, insufficient in amount, however, to produce temperatures high enough to destroy the tissues or impair their vitality. The available evidence indicates that the therapeutic effects are limited to the heat produced. The reader is referred to the Handbook of Physical Therapy or other Council accepted publications for the therapeutic indications of diathermy currents.

The following are some of the special safety rules for medical diathermy as given in the Handbook of Physical Therapy:

Before applying electrodes, inspect carefully the parts to be treated to make sure that the continuity of the skin is nowhere broken and that the heat sensation of the patient is normal.

Before turning on the current from the main inlet inform the patient that all the sensation he can expect is that of mild heat. Instruct the patient to report any uncomfortable faradic sensation, pricking or burning, at once.

Do not try to raise the current to the maximum amount of toleration during the first few treatments. Patients often are burned in their endeavor to show how much current they can stand. Remember the principle that a moderate amount of heat applied for a longer period is more effective than pushing up to the limit of tolerance for a shorter period.

If at any time during the treatment the patient complains of an uncomfortable sensation anywhere, turn off the controls, shutting off the main current inlet in case of emergency and, if necessary, take off, inspect and reapply the electrodes. When inspecting or adjusting electrodes, be sure that the current is turned off and increased gradually again after such a procedure.

Do not leave the patient alone during treatment unless arrangements have been made so that the patient himself can turn off the current at any time.

Medical diathermy is contraindicated (1) in acute inflammatory processes such as acute nondraining cellulitis, acute arthritis characterized by infection, and acute pelvic infection; (2) in any condition in which there is a tendency to hemorrhage, such as a gastric ulcer, and (3) in those areas in which the appreciation of heat has been impaired or lost, as in certain peripheral nerve injuries. It is also contraindicated in diseases or injuries in which simpler methods of applying external heat give satisfactory results.

Although the surgical removal of tonsils is to be preferred, in certain selected cases the electrosurgical method has proved of value in tonsillectomies in patients presenting contraindications for ordinary surgical procedures such as cardiac disease and advanced age. The destruction of the tonsil is effected in several stages, by applying the current alternately first to one side and then to the other, at intervals of one or two weeks. Such patients are usually ambulatory.

The method is by no means simple and only skilled surgeons should attempt it. Those operators unfamilar with the intensity of the high frequency currents and their depth of penetration may easily carry destruction into deep-seated structures adjacent to the diseased areas. Especially is this true of blood vessels (a carotid, for example) leading to and from the part of traversing neighboring tissues.

Ultraviolet Rays and Catalase Content. Abst. in Jour. A.M.A., 100:20:1651, May 20, 1933, from Munchen. med. Wchnschr. 80:332, March 3, 1933.

Koeppe calls attention to the fact that the great significance of catalase for all oxidation processes in the organism, and its consequent importance for all life processes of the cells, is based only on the factor that all cells decompose hydrogen dioxide and that therefore all cells must contain catalase. In recent times the catalase has been measured by determining the oxygen liberated in the decompensation of hydrogen dioxide. Certain aspects of this energy determination could be studied through the influence exerted by the ultraviolet rays of the quartz lamp on hydrogen dioxide, and the experiences gained thereby were an advantage in catalase determinations of the blood. The author discusses a number of investigations on the action of the ultraviolet rays on ferments and shows that many of them contradict one another. His own studies likewise contradicted one another at first, for the influence of irradiation on the blood catalase became manifest either as an increase or as a decrease in the catalase value. Only after the initial value had been given consideration did these results become clearer. It was found that, when the initial catalase values were high, irradiation with ultraviolet rays effected a decrease, whereas a low initial value was found to be increased after irradiation. Thus the catalase content plays an important part in the determination of the correct dosage in ultraviolet ray treatment of rickets. The author's studies convinced him that children with low or average catalase content are suitable for ultraviolet ray treatment, while those with high catalase content are not. In children in whom ultraviolet irradiation was omitted because of high catalase content, improvement set in just the same. The author admits that catalase determinations before and after irradiation with ultraviolet rays reveal only the response of the organism to irradiation, but he admits that this test method cannot replace the "erythema dose" test, for there are no relations between the two test methods.

Tuberculosis and Light Baths. Abst. in Jour. A. M. A., 100:20:1651, May 20, 1933, from Munchen med. Wchnschr., 80:327, March 3, 1933.

Jesionek points out that light baths have a curative effect not only on tuberculosis foci in the skin but also on tuberculosis processes within the body. On the other hand, it is possible that light baths produce an unfavorable influence on tuberculous processes. The author bases the explanation of the mechanism of this function of the skin on experimental studies indicating that the skin has an antituberculous function and is the source of the natural defense substances of the organism against the tubercle bacillus. He considers these substances as esophylaxins and designates them as epidermidal antituberculins. Already Robert Koch had noticed that the intracutaneous introduction of killed tubercle bacilli gives a quite different reaction from that caused by the subcutaneous administration. Following a discussion of animal experiments and of observations on human beings, the author points out that in civilized human beings the epidermal source of the natural and antituberculous defense substances flows slowly and deficiently, because only a small portion of the skin is exposed to the adequate stimuli provided by air and light. The light and air bath withdraws the skin from this unnatural condition, interrupts the evenness of the light and temperature status to which the skin of civilized human beings has become accustomed, and frees the skin from the confining influences that reduce its metabolic functions. The first stimulus exerted by the light and air bath following the removal of clothing depends on the fluctuations in the temperature. The reduced temperature, the increased pressure exercised by movements of the air and the influence of the light increase the blood perfusion of the skin, and this combination of stimuli, by way of the parenchyma cells that are susceptible to stimuli of heat, pressure or light, regulates the blood perfusion and the blood content of the skin. In this regulation of the blood supply of the skin the author sees the most important biologic action of the light and air bath, because the blood supply determines the nutrition, the chemical composition, the warmth and the pressure of the skin, as well as the function and the metabolic rate of the skin cells. The increase in the blood perfusion also enables the skin cells to produce antituberculous and tuberculolytic substances. In order to avoid the possible detrimental effect of the light and air bath in tuberculosis it is essential not only to avoid light induced inflammation of the skin but also undercooling and overheating, for such influences may paralyze instead of stimulating the parenchymal cells of the skin.

Radiation in Treatment of Psoriasis. Abst. in Jour. A. M. A., 101:4:324, July 22, 1933, from Brit. J. of Physical Medicine, London, 7:215, March, 1933.

Goeckerman believes that the symptomatic treatment of psoriasis by the use of crude coal tar and ultraviolet irradiation is the most effective method of treatment. It is probable that the superior results are affected by substances produced by photochemical changes in the tar. Removing the psoriatic patches by this method has had a striking symptomatic effect on an associated arthritis in about 50 per cent of the cases treated. Exfoliative dermatitis secondary to psoriasis responds as well to this method of treatment as typical psoriasis. This complication usually develops as the result of intercurrent infection, arsenic preparations internally, or irritants locally. The results of treatment by tar and ultraviolet irradiation do not warrant the assumption that the skin has undergone a form of degeneration in this form of exfoliative dermatitis. Under hospital conditions, an ointment containing from 1 to 5 per cent of crude coal tar is applied about one-eighth inch (3 mm.) thick to the various patches, whether large or small. The ointment used by the author consists of an incorporation of the proper percentage of crude tar in about the equivalent of Lassar's paste without salicylic acid. The ointment remains in contact with the patches until the next day. The excess of ointment is then removed with olive oil; a thin film, enough to look like a brown stain, is purposely allowed to remain. These patches are then exposed to quartz lamp radiation, beginning with a small dose to avoid any reaction. The ointment is reapplied and the exposure given daily. As the patient becomes accustomed to the exposure, the dosage may be rapidly increased. Gradual tanning is the object desired. Following daily exposure to the light, the patient may take a soap and water, or, if his skin is sensitive, an oatmeal and soda bath. He is then permitted to spend several hours in comfort, before the procedure is repeated. Mild conditions clear up in from two to three weeks.

Book Reviews

The Diagnosis and Treatment of Postural Defects. By Winthrop M. Phelps, B.S., M.D., M.A., Professor of Orthopedic Surgery and Robert J. H. Kiphuth, Assistant Professor of Physical Education, Yale University. Pp. 180 with 108 illustrations, price $4.00, Springfield, Illinois, Charles C. Thomas, 1932.

A knowledge of postural defects, their causes and correction may be said to form the basis of all physical therapy. Orthopedic surgeons and physical therapists have studied the subject for many years. In the field of internal medicine the relation between visceroptosis and endocrine disturbances and posture are known. A prominent surgeon recently has shown in this journal the relationship between abdominal pain and posture. A gynecologist has shown that in dysmenorrhea a reduction in menstrual pain has occurred along with a decrease in imperfect posture as a result of directed physical exercise. Therefore, this book is of value to those interested in physical therapy.

The corrective exercises are presented in detail and well illustrated. They are for use mainly in schools, camps, associations and clubs offering a physical education program. This makes the book of special value to those engaged in this work. Many of the cases seen in the hospital physical therapy departments could not start on the exercises given in this book, and too little attention has been paid to the milder exercises for the correction of body mechanics. But for those in the physical education field it is one of the best books that has appeared on the subject of postural defects.

Fractures. By Paul B. Magnuson, M.D., Associate Professor of Surgery, Northwestern University Medical School, Chicago, Illinois. Pp. 466, with 317 illustrations. Price $5.00. Philadelphia, J. B. Lippincott Co., 1933.

This book was written as an effort to simplify the methods of treatment, and to approach the problem of fractures from the standpoint of anatomy and physiology. It admirably fulfills this effort, and should be in the hands of every physical therapist treating fractures.

If the direction and amount of force which causes the fracture; the muscle action which causes the deformity; and the fundamentals in the mechanics of reduction are understood by the physical therapy technician, she can carry out her part with more satisfaction to the surgeon and with more benefit to the patient.

The contents include chapters on pathology and repair of fractures, the anatomical mechanism and equipment in the reduction of fractures, fractures of all bones except the jaw, and physical therapy in fractures. Under postoperative treatment of fracture-dislocation of the spine, the question of massage, electrotherapy, exercises and muscle reeducation are considered thoroughly. The special chapters on physical therapy discuss the use of heat, whirlpool baths and diathermy, giving the methods of using heat and baths at home, the physiologic effects of heat in fractures and the contra-indications for diathermy. Under massage there is given the definite technique, and a table with the time to start massage and motion in the average case of the various fractures. Graduated muscle contractions and ultraviolet radiation in fractures is also considered. There is a chapter on exercise in treatment of fractures in which passive, static and active exercises are described. The importance and technic of reeducation in walking after fractures of the bones of the leg or foot are described.

It is therefore apparent that this book offers much information to make simpler and easier the treatment of fractures and to improve the end result.

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CHICAGO, ILLINOIS

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